BRITISH COLUMBIA
MINISTRY OF FORESTS

Kispiox Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective January 1, 2003

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Objective of this document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the Kispiox Timber Supply Area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TSA

The Kispiox Timber Supply Area (TSA) encompasses 1.22 million hectares in the northwestern portion of the province. The TSA lies in the Prince Rupert Forest Region, and it is currently administered from the Kispiox forest district office in Hazelton. It is bordered by the Nass, Prince George, Cranberry, Kalum and Bulkley TSAs, and also Tree Farm Licence (TFL) 1. About 57 percent of the TSA land base is considered to be productive forest land managed by the B.C. Forest Service.

The topography of the TSA is varied, with several mountain ranges (the Atna, the Babine, the Nass, the Seven Sisters, the Kispiox, the Rocher Deboule and the Kuldo), broad valleys, and a number of major river systems, including the Kispiox, Skeena, Bulkley, Babine and Cranberry Rivers.

Dominant tree species occurring on the timber harvesting land base are western hemlock and subalpine fir (balsam). Spruce, lodgepole pine, western redcedar, amabilis fir and cottonwood are also found in the TSA.

The 1996 census indicated the population of the TSA was 6,292 persons, although early estimates from 2001 indicated that this population had declined by about 5 percent to 5,995. The District of New Hazelton is the largest community in the TSA, with smaller communities including Hazelton, South Hazelton, Kitwanga, Cedarvale, Kispiox, Gitsegukla, Gitwanga and Gitanyow. First Nations persons living on reserves within the TSA totalled 2800 persons in 1995.

History of the AAC

In 1981, the AAC was determined at 1 100 000 cubic metres. The AAC remained at that level until 1996, at which time I set a new AAC of 1 092 611 cubic metres. That level remains in effect today and is currently apportioned by the Minister of Forests as follows:

Apportionment	cubic metres	percent of AAC
Forest Licences, replaceable	788 065	72.1
Forest Licences, non-replaceable	30 435	2.8
Timber Sale Licences, > 10000 m^3, replaceable	11 980	1.1
Timber Sale Licences, <= 10000 m^3, replaceable	5 054	.5
Small Business Forest Enterprise Program	242 466	22.2
Forest Service Reserve	11 000	1.0
Woodlot Licences	3 611	.3
Total	1 092 611	100.0

New AAC determination

Effective January 1, 2003 the new AAC for the Kispiox TSA will be 977 000 cubic metres.

This AAC excludes all volume issued to woodlot licences since the 1996 determination.

This AAC will remain in effect until a new AAC is determined, which may take place within five years of this determination.

Information sources used in the AAC determination

Information considered in determining the AAC for the Kispiox TSA include the following:

- *Kispiox TSA Data Package and Information Report*, BCFS, October 2000;
- *Kispiox TSA Analysis Report and Public Discussion Paper*, BCFS, May 2002;
- *Kispiox TSA Summary of Public Input on Data Package and TSA Analysis Report*, BCFS, November 2002;
- Letter from the Minister of Forests to the chief forester, dated July 28, 1994, stating the Crown's economic and social objectives for the province;
- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives for the province regarding visual resources;
- Technical review and evaluation of current operating conditions through comprehensive discussions with staff of the BCFS, including the AAC determination meeting held in Hazelton, June 25, 2002;
- *Kispiox TSA Rationale for AAC determination*, BCFS, December, 1996;
- *Kispiox TSA Timber Supply Analysis*, BCFS, August 1996;
- Kispiox Land and Resource Management Plan, 1996;
- *Forest Practices Code of British Columbia Act*, consolidated to May 2002;

- *Forest Practices Code of British Columbia Act* Regulations and Amendments, current as of May 2002;
- Forest Practices Code of British Columbia Guidebooks, BCFS and MELP;
- *Site index adjustments for old-growth stands based on veteran trees.* Working Paper # 36, G. Nigh. BCFS Research Branch, Victoria, B.C., 1998;
- *Forest Practices Code Timber Supply Analysis*, 1996;
- *Identified Wildlife Management Strategy*, February 1999;
- *Nisga'a Final Agreement*, initialled by the Government of Canada, Province of B.C., and the Nisga'a Nation, August 4, 1998.
- *Landscape Unit Planning Guide*, BCFS and MELP, March 1999;
- *Higher Level Plans: Policy and Procedures*, BCFS and MELP, December 1996.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for the Kispiox TSA, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 is reproduced in full as Appendix 1.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. In making a large number of determinations for many forest management units over extended periods of time, administrative fairness requires consistency when addressing these changes and associated uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. If in some specific circumstance it is necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, in cases where projections of short-term timber supply are not stable, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine these AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were originally approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995. The timber supply implications of some of the Act and its regulation, in some cases still remain uncertain, particularly when considered in combination with other factors (for example landscape biodiversity provisions). In each AAC determination, I take these uncertainties into account to the extent possible in context of the best available information.

More recently, on November 21, 2002, government passed the new *Forest and Range Practices Act*, which will ultimately replace the *Forest Practices Code of British Columbia Act.* As the timber supply implications of this new Act and any pursuant regulations become clear and measureable, they will be accounted for in AAC determinations. Uncertainties will continue to be handled as they were under the previous legislative regime.

The eventual timber supply impacts associated with strategic land-use decisions resulting from the various planning processes—including land and resource management plans, the Protected Areas Strategy, or other area-based planning processes—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions not yet taken by government. Thus I do not account for possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

However, where specific protected areas have been designated by legislation or by order in council, these areas are deducted from the timber harvesting land base and are no longer considered to contribute to the timber supply in AAC determinations.

In the Kispiox TSA, government's approval of the Kispiox Land and Resource Management Plan (Kispiox LRMP) in 1996 has clarified many aspects of land and resource use and management. Some of the objectives from the Kispiox Land and Resource Management Plan were declared as a higher level plan in April 1997. The ongoing implementation of these objectives continues to provide further certainty regarding resource management in the area (see Kispiox Land and Resource Management Plan section).

A number of intensive silviculture activities have been undertaken in the past that have the potential to affect timber supply, particularly in the long term. As with all components of my determinations, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs between 1992 and 1996. In any case, the data and models available today are improved from those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent decisions in the British Columbia Court of Appeal and the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting the Crown's obligations under these decisions. In this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Kispiox TSA. My determination is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

The British Columbia Court of Appeal decided in March 2002 that pending the final determination of the existence of aboriginal rights and title, the Crown has an obligation to consult with First Nations with respect to asserted rights and title in a manner proportional to the strength of the interests. I consider any information brought forward respecting First Nations' interests. In particular I consider information related to actions taken to protect interests, including operational plans that describe forest practices designed to seek to address such First Nations' interests. In this context, I iterate that my AAC determination does not prescribe a particular plan of harvesting activity, nor does it involve allocation of the wood supply to any particular party.

If, subsequent to this determination, I become aware of information respecting First Nations interests that would substantially alter the estimate of timber supply underlying my determination, I may revisit my determination.

Overall, in making AAC determinations, I am mindful of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act* and of my responsibilities under the *Forest Practices Code of British Columbia Act* and the *Forest Act*.

The role of the timber supply analysis

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the timber supply review process.

For each AAC determination for a TSA, a timber supply analysis is carried out using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model (Forest Stand Simulator, or FSSIM), a series of timber supply forecasts is produced, reflecting different starting harvest levels, rates of change over time, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the

long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TSA is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current available information about forest management, which may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgements that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Base case forecast for the Kispiox TSA

The base case harvest forecast presented in the *May 2002 Kispiox Timber Supply Area Analysis Report* incorporated the most current available information on forest management, land base and timber yields for the TSA. The forecast included specific assumptions about the TSA that are discussed in detail in the analysis report.

Given the specific assumptions applied, the analysis indicated that the current AAC of 1 092 611 cubic metres could not be achieved without causing disruptive harvest shortfalls in the future. In the base case, an initial harvest level of 903 000 cubic metres per year (17 percent lower than the level of the current AAC), could be maintained for one decade, after which the level declined by approximately 10 percent per decade for several decades, before reaching a long-term harvest level of 430 000 cubic metres per year in the eighth decade.

I note that in this rationale, I will discuss many of the analysis assumptions in the context of my considerations for this AAC determination. However, for some factors, my review of the assumptions has indicated that I am satisfied the factor was appropriately modelled in the base case of the timber supply analysis. In such cases I will not discuss my considerations in detail in this document, other than to note my agreement with the

approach that is already documented in the timber supply analysis report. Some factors for which the assumptions were appropriately modelled in the analysis may warrant discussion, however, for other reasons, such as a high level of public input, lack of clarity in the analysis report, or concerns resulting from the previous determination for the Kispiox TSA. As a result, I may choose to provide my consideration of such factors in this rationale.

I am aware that the 2002 timber supply analysis projects a different harvest forecast than was projected at the time of the previous analysis for the Kispiox TSA. The previous analysis indicated that a harvest level of 1 100 000 cubic metres per year could be maintained for four decades before beginning a series of 10 percent declines to a long term harvest level. Staff indicate that the reason for the differences in projected timber supply are complex, but are largely as a result of a 17 percent decline in the size of the timber harvesting land base and higher estimates of non-recoverable losses assumed for the 2002 analysis. The timber harvesting land base declined by this amount largely as a result of new protected areas and reductions for unharvested retention in stands. Non-recoverable loss estimates for balsam bark beetle and Tomentosus root disease were new to the 2002 analysis. Many other management assumptions also varied between the two analyses, and as a result, comparison between this and the previous analysis should be made with recognition of the extent and nature of these changes. My considerations of these factors and others relevant to the decision are discussed later in this rationale.

I am aware that there were specific considerations consistent with current timber supply review policies which led to the choice of the 2002 reference forecast. These considerations centred around the long-term stabilization of the growing stock on the timber harvesting land base. I have considered the reasoning used to select the base case harvest forecast and I am satisfied that the forecast selected presented the best stabilization of growing stock. The alternative harvest forecasts that were considered are discussed later in this document.

I have also considered all public input received on the data package and analysis report, and where appropriate I discuss this input in my considerations under the various factors presented in this rationale.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(b) the rate of timber production that may be sustained on the area, taking into account

(ii) the composition of the forest and its expected rate of growth on the area,

Land base contributing to timber harvesting

- general comments

As part of the process used to define the timber harvesting land base in the timber supply analysis, a series of deductions are made from the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the

productive forest area for harvest, for ecological, economic or social reasons. The deductions in the Kispiox TSA timber supply analysis resulted in a timber harvesting land base of 263 046 hectares, or approximately 38 percent of the productive forest area in the TSA.

I have considered all of the deductions applied in the derivation of the timber harvesting land base for the Kispiox TSA. Those assumptions related to factors associated with the derivation of the timber harvesting land base for which, based on my thorough review, I accept the assumptions applied in the analysis, are not discussed below. These factors include the accounting in the analysis for non-merchantable forest types, deciduous forest types, roads, trails and landings, sites with low timber growing potential, woodlot licences and protected areas.

I note that where my consideration of the information has identified a factor which in my estimation requires discussion in this document, it is described below.

- economic and physical operability

Those portions of the TSA which are neither physically operable nor economically feasible to harvest are categorized as inoperable, and are excluded when deriving the timber harvesting land base.

Operability lines were established in 1988 for the Kispiox TSA, based on the exclusion of areas with slopes greater than 70 percent, rock outcrops, steep gullies, avalanche tracks, and isolated small stands of timber. Areas with average volumes of between 150 and 200 cubic metres per hectare, and areas where road building would be too difficult and/or too costly were also considered to be inoperable. A total of 305 231 hectares were excluded as inoperable from the timber harvesting land base in the analysis.

In my previous determination for the Kispiox TSA, I requested that district staff monitor the use of alternative logging systems and practices in inoperable areas, particularly with respect to helicopter logging in the northern portion of the TSA. Helicopter logging was not a consideration when the operability lines were originally developed. Staff note that some areas currently described as inoperable have been identified on Forest Development Plan (FDP) submissions as having potential for helicopter logging. However, as was the case at the previous determination, there has been very little helicopter harvesting in the TSA, and it is not known whether any will occur in the near future.

Input from a forest consultant noted that there were no exclusions in the analysis to account for economically inoperable stands. The consultant noted that stands had been included in the timber harvesting land base that were physically operable and had acceptable site index thresholds, but either had low sawlog content, required expensive development or were located at long haul distances from mills. BCFS staff confirm that the operability mapping primarily accounted for physical operability, (it involved the use of generalized total volume criteria with no accounting for age class, and did not incorporate criteria to account for the areas of concern).

In consideration of this information, I concur that the lack of accounting for stands with low economic marketability potential is of concern. The assumptions as applied in the analysis result in the assumed contribution to timber supply of all stands that meet the minimum volume criteria and that are located within physical operability lines. This does not account

for the quality of the volume within these stands, nor for such factors such as remote locations from mills or roads. In particular, I am aware that approximately 85 000 hectares of older (250 years of age and older, or age class 9) hemlock- and balsam-leading stands located on poor sites were entirely included in the timber harvesting land base. District staff indicate that those stands located relatively close to mills would likely be harvestable under current market conditions, but the remainder are questionable. Staff note that very little harvest activity has occurred north of the Babine River in recent years, and that there are still extensive tracts of undeveloped area in the TSA that would require significant expenditures in order to access them.

The Gitxsan First Nation submitted comment on operability as part of their submission on the timber supply review, as is mentioned under First Nations considerations. I note that operability is intended to define stands that are operable across a broad range of market conditions, not just the most economically profitable stands. However, it is questionable as to whether some of these stands would be economic to harvest under any market conditions.

I accept for this determination that the operability information used in the analysis represents the best available information in terms of describing the land base physically accessible. However, I believe that not all of the older hemlock- and balsam-leading stands on poor sites will prove to be economically operable in the Kispiox TSA over time. I again note that these stands comprise 85 000 hectares or 32 percent of the TSA's timber harvesting land base. In particular, I am concerned about the operability of those stands located in the Interior Cedar Hemlock (ICH) biogeoclimatic zone, with high pulp content and located sufficiently distant from mills. My experience has been that in the timber supply analyses for other units some proportion of these types of stands are typically excluded.

While there is no specific quantitative analysis available to provide any further direction on this matter, I feel strongly that assumptions used in the analysis do overstate the timber harvesting land base due to the considerations outlined in this section. I am therefore left to applying my judgement in this matter, and in doing so, I draw on my knowledge of other units with similar considerations as well as my personal knowledge of the types of forests involved. That said, I am applying an order of magnitude of the possible overestimate, absent of any further direction on the appropriate level of contribution of the stands in question.

In the absence of more quantifiable data regarding their operability in this TSA, I think it is reasonable to assume that some proportion of these stands, likely in the range of between 10 and 20 percent, will not in fact be operable over time. As such, I will take into account in this determination that timber supply has been overestimated by between 3 and 6 percent, and I will discuss this further under 'Reasons for decision'.

I request that district staff review the inclusion of all of these stands, and attempt to develop a set of criteria that can be used to account for economic operability prior to the next analysis for the Kispiox TSA.

- environmentally sensitive areas

Environmentally sensitive area (ESA) data identify areas sensitive to disturbance due to soil conditions, prone to avalanches, difficult to regenerate and/or with significant value for wildlife or recreation resources. ESA classifications of E1 (highly sensitive) or E2 (moderately sensitive) may be used in timber supply analyses to exclude areas from the land base where more specific or detailed information is not available about a particular forest resource.

In my previous determination for the Kispiox TSA, I requested that district staff re-examine environmentally sensitive areas and their corresponding incorporation into or exclusion from the timber harvesting land base. To address this request, district staff reviewed the data for Ep (areas considered difficult to regenerate) and concluded that these areas had already been accounted for with other reserves excluded in the analysis, or alternatively that the areas are operationally being reforested to stocking standards and should be considered to contribute to timber supply. Therefore, no specific exclusions were applied in the analysis on this account. Further, staff noted that areas labelled as Er (recreation resources), Ew (wildlife resources), and Eh (water quality) were accounted for with other exclusions applied in the analysis, and therefore these areas were not specifically excluded using the ESA data.

Terrain stability mapping was completed in the Kispiox TSA in 1999. This mapping was used in the analysis to determine appropriate exclusions for sensitive soils. Sites classified as unstable (class V terrain) were 100 percent excluded from the timber harvesting land base because the classification of these areas were assumed to preclude operations.

District staff indicate that in order to determine the appropriate exclusion percentages to apply to class IV terrain, a map overlay was used to compare areas classified as class IV terrain with areas harvested. Staff note that results of this review suggested that only 5 percent of the total area harvested was classified as class IV terrain. Therefore, in the base case of the analysis, 95 percent of class IV areas were excluded from the timber harvesting land base.

In total, 28 916 hectares were excluded from the productive forest land base to account for areas prone to avalanche and areas considered to be unstable or potentially unstable.

In its input on the data package, Bell Pole noted that exclusion of 95 percent of potentially unstable sites was not consistent with current management. The licensee noted that such sites are frequently harvested in full or in part, or may overlap with wildlife tree patch (WTP) areas. The licensee cited that data from a recent review of three operating areas suggest that a 5 percent exclusion of potentially unstable areas would be more consistent with current management than the 95 percent exclusion applied in the analysis. This sentiment was echoed by Skeena Cellulose, both Carnaby and Terrace divisions, in their public input. The licensees stated that experience suggests a significant percentage of areas classified as Es2 (terrain class IV) are harvestable without environmental impact.

I have considered the information about the reductions applied in the analysis to account for sensitive areas. I am satisfied that the review of Ep areas, and the decision to not specifically exclude these areas using ESA data, is reasonable. Similarly, I commend the district's approach to the review of Ew, Eh and Er areas, and subject to any observations

under those factors, I am satisfied that these resource values have appropriately been accounted for in the analysis through other means.

With respect to the exclusions applied to account for sensitive soils, I have the following observations. I accept that it is reasonable to assume that 100 percent of unstable areas will constrain harvesting activities, and therefore that these areas were appropriately excluded from the timber harvesting land base. I note that the use of terrain stability information for the assessment of unstable terrain for this analysis represents a significant improvement over the use of the older ESA data for soils.

However, I am not as convinced that the reductions applied to account for the management of potentially unstable terrain are as reasonable. I am not certain that the methodology used by the district to evaluate current practices in this regard is appropriate. The methodology only included an examination of areas harvested, and was not weighted by frequency of occurrence of class IV terrain and did not consider the unharvested portion of the timber harvesting land base. In my view, an examination of the proportion of harvested area that was class IV terrain does not provide an accurate assessment of the total proportion of class IV terrain that is actually harvestable. Although the data used for the analysis was based on current practices, staff note that the majority of harvest has occurred in valley bottom areas with little class IV terrain, and that this does not necessarily represent the location of future harvests. For factors such as soil stability, it is important to be able to represent a reasonable extrapolation of practices in the TSA. Further, I am aware that in other management units, areas classified as class IV terrain do not typically represent total prohibition to logging, but rather indicate the need for caution and further assessment prior to conducting operations on such areas.

Staff advise that a total of 21 300 hectares were excluded as terrain class IV in the timber supply analysis. This area represents about 6 percent of the timber harvesting land base in the Kispiox TSA, which if considered to fully contribute to timber supply would likely increase the harvest level by an equivalent percentage.

Having considered the information about the exclusions applied in the analysis to account for moderately sensitive areas, I believe that the timber harvesting land base has been underestimated on this account. However, it is unlikely that it has been underestimated by as great an amount as 6 percent, because I believe that some proportion of these areas will indeed prove to be unharvestable. I note that due to the lack of operations in the majority of the areas, the appropriate exclusion to apply to account for the unharvestable proportion is as yet uncertain. In this determination, I will take into account that timber supply has been underestimated by up to 6 percent, and I will discuss this further under 'Reasons for decision'.

Existing forest inventory

The Kispiox TSA was re-inventoried in 1992. For the analysis, the data was updated for harvesting, depletions, and silviculture activities to 1999. The most recent years of harvesting activity were not reflected in the inventory data.

However, district staff inform me that although the harvest level in the TSA in the year 2000 was close to the level of the AAC, harvesting in 2001 and 2002 occurred at a level much below the AAC. As a result, the difference in terms of forest inventory volume

between what was estimated in the analysis, and what is truly out there, is believed to be minimal. Therefore, although I am aware that the forest cover data used in the analysis did not reflect any harvesting activity since 1999, I am satisfied that the implications in terms of timber supply are small and I will make no adjustments on this account in this determination.

An audit was conducted in 1996 by the former BCFS Resources Inventory Branch (now the Terrestrial Information Branch in the Ministry of Sustainable Resources Management) on the inventory, which assessed, among other things, the mature component of the inventory, evaluating differences between the existing inventory's estimate of mean mature volume per hectare for the TSA and a new estimate obtained from the audit samples. The results of the inventory audit are discussed in the next section of this rationale.

- volume estimates for existing stands

Volumes for existing natural stands (in which species and stocking have not been managed) were estimated and projected using the forest inventory attributes and the Variable Density Yield Prediction (VDYP) model version 6.5, developed by the former BCFS Resources Inventory Branch (now the Terrestrial Information Branch in the Ministry of Sustainable Resources Management).

The 1996 inventory audit conducted in the Kispiox TSA suggested that the inventory data overestimated volumes for existing mature (greater than 60 years of age) stands on the operable land base by 13 percent. The audit further suggested that the overestimation was attributable to both the classification of attributes on the inventory file and the volume projection by VDYP, i.e., that the bias existed in both the classification and the model. The number of plots in the audit was insufficient to facilitate a meaningful stratification of the results in order to isolate any sources of the discrepancy.

Sensitivity analyses were conducted to assess the timber supply implications, if existing stand volumes are overestimated by the amount suggested in the inventory audit. A 13 percent reduction in existing stand volumes could result in a 34 percent decrease in the initial harvest level projected in the base case. BCFS staff advise that the large impact in the short-term results from a longer allocation of the existing available growing stock than in the base case, until such time as adequate volume is available from managed stands to support the harvest level. However, additional analysis indicated that an initial harvest level only 13 percent below that in the base case is possible if a lower mid-term harvest level of 340 000 cubic metres per year between decades 9 and 16 was acceptable.

At the time of my previous determination, I requested that district staff study incremental growth rates of old growth stands in the TSA that had been attacked by balsam bark beetle, in order to determine appropriate volume loss factors to apply in these stands for future analyses.

To address this uncertainty, a study was conducted in the Kispiox TSA to assess volume losses from balsam bark beetle. The study included a cruise-style audit, and was designed such that it was possible to check the calculated stand volumes against those for the inventory. Volumes for balsam-leading stands greater than 100 years of age were estimated. The results of the study indicated that the inventory did not overestimate volumes compared to those found operationally in this sample of balsam-leading stands,

and in fact suggested that the inventory may slightly underestimate volumes for these stands.

The results of the balsam study, as well as one to evaluate the impact of tomentosus root disease, were also used to derive estimates for non-recoverable losses in the timber supply analysis. These estimates, and my consideration of the analysis assumptions, are discussed in that section of this rationale.

Regional staff note that the study for tomentosus indicated that volume estimates for spruce-leading stands more than 80 years of age were not overestimated in the forest inventory file. However, timber supply branch staff indicate that the tomentosus study, although statistically rigorous, was not specifically designed in such a manner so as to be a check on the inventory, and caution against using the results in this manner.

Overall, district staff do not indicate any particular concern with the volumes as estimated for existing stands by the forest inventory.

Having considered the information about existing stand volumes assumed for the analysis, as well as the results of the balsam study, I have the following observations.

I am aware that the audit assessed volumes for existing stands over the entire TSA and the results suggested an overestimate by the inventory of approximately 13 percent. However, the results from the balsam bark beetle study indicated that inventory volumes for existing balsam-leading stands more than 100 years of age may in fact be reliable. These stands form a relatively small portion of the timber harvesting land base of the TSA, and therefore it is difficult to assess whether the results noted for balsam would be applicable to stands on any other portions of the timber harvesting land base. The audit was not able to definitively isolate the source of uncertainty in the volumes, and subsequent review by staff has not been able to identify the source of the inventory overestimation, if it is indeed present.

At this point, with the information that is available, I acknowledge that there is some uncertainty around the volume estimates for existing stands, and a possibility that the inventory data used in the timber supply analysis may overestimate volumes. I will take this uncertainty into account in this determination as a risk to short-term timber supply, and I will discuss my considerations of this further under 'Reasons for decision'.

Expected rate of growth

- site productivity estimates

Inventory data includes estimates of site productivity for each forest stand. Site productivity is expressed in terms of a site index, which is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow, which in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the age at which a stand will reach a merchantable size.

In general, in British Columbia, site indices determined from younger stands (i.e. less than 31 years old), and older stands (i.e. over 150 years old) may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to

measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—such as the Old-Growth Site Index (OGSI) 'paired plot' project and the 'veteran' study—as well as results from using the Site Index Biogeoclimatic Ecosystem Classification System (SIBEC) suggest that actual site indices may be higher than those indicated by existing data from old-growth forests. Such studies indicate that site productivity has generally been underestimated by the inventory file data; managed stands tend to grow faster than projected by inventory-based site index estimates from old-growth stands.

Sensitivity analyses were used to assess the timber supply implications if the site index adjustments suggested by the provincial OGSI studies were appropriate for the stands in the Kispiox TSA. Paired plot data was used to prepare site productivity estimates for lodgepole pine- and spruce-leading stands, and veteran tree data was used for hemlock- and balsam-leading stands. In the first sensitivity analysis, in which the paired plot data alone was used, the long-term harvest level after the tenth decade increased to 530 000 cubic metres per year, 23 percent above the base case level. In the second sensitivity analysis, in which both the paired plot and the veteran tree results were used, the harvest level increased after the fourth decade to 607 000 cubic metres per year, and to 675 000 cubic metres per year after the sixteenth decade. The results suggest that, if the adjustments indicated by the province-wide studies were appropriate and applicable to all species in the Kispiox TSA, mid-term timber supply could be up to 40 percent greater, and long-term timber supply up to 57 percent greater, than shown in the base case.

One local site index study has been conducted in the Kispiox TSA that suggested a 5-metre increase in site index might be appropriate for hemlock-leading stands. However, the methodology for the local study was not quite robust enough to support an adjustment to the base case site productivity estimates on this account, as discussed in the rationale for my previous AAC determination. Site index studies conducted in the adjacent Kalum TSA supported the premise that the site indices for regenerating hemlock-leading stands in that TSA were underestimated by the estimates based on old growth stands from the forest inventory file data. Public input was received which requested assessment of the applicability of these results to the Kispiox TSA. Although a detailed review has not been undertaken, I note that the difference in biogeoclimatic zone between that of the studied stands (Coastal Western Hemlock (CWH)), and the Interior Cedar Hemlock (ICH) zone prevalent in the Kispiox TSA, does not allow for a meaningful application of the results in this TSA.

I acknowledge that some uncertainty exists with respect to the ultimate performance of second growth stands relative to their potential. However, data from the paired-plot study clearly demonstrates that stands are growing at a much faster rate than would be expected based on measurements from the standing old growth inventory. Given existing silvicultural requirements, it is reasonable to expect that full stocking will occur in the majority of managed stands, and that the stands will be managed to minimize losses to pests and competing vegetation. Therefore, while the exact magnitude of the productivity increase is not certain, I believe it is highly reasonable to expect that most second-growth stands will grow more quickly than productivity estimates from old-growth stands would suggest.

However, in the Kispiox TSA, optimism about the productivity of future stands is tempered by the impacts on managed stands of the Dothistroma foliar disease, which is discussed in detail under *volume estimates for regenerated stands*.

In consideration of the information on site productivity, I expect that it is likely that the mid- to long-term timber supply is indeed more robust than shown in the base case for the Kispiox TSA. However, until additional local data is collected in the TSA, it is difficult to determine to what extent the timber supply increases shown by the sensitivity analyses may be possible for this TSA. In any event, I note that any underestimation of the site productivity of second growth stands does not affect short-term timber supply.

For this determination, I will take into account that mid-term timber supply has been underestimated by up to 40 percent, and that long-term timber supply has been underestimated by up to 57 percent, and I will discuss this further under 'Reasons for decision'.

- volume estimates for regenerated stands

To estimate volumes for managed stands, the BCFS uses the Table Interpolation Program for Stand Yields (TIPSY), developed by the BCFS Research Branch. In the analysis for the Kispiox TSA, managed stands were defined as all stands between one and twenty years of age, as well as all stands regenerated in the future.

TIPSY projections are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition in the stand. Operational adjustment factors (OAFs) are applied to account for small stocking gaps in stands (OAF1), as well as for age-dependent factors such as pests, disease, decay, waste and breakage (OAF2). In the BCFS analysis, the provincial standard reductions of 15 percent for OAF1 and 5 percent for OAF2 were applied.

1) use of select seed

The Forest Practices Code requires the use of the best genetic quality (seed and vegetative material) source available for regeneration. Select seed produced from seed orchards is the product of B.C.'s forest gene resource management program, which uses traditional tree breeding techniques to select naturally-occurring, well-adapted, healthy and vigorous trees. Select seed from seed orchards produces trees that grow faster than those from natural stand seed. As a result, a stand composed of such trees has a greater volume at the same age than a natural stand with the same species composition. Current expectations are that the volume differences will begin to decrease beyond a certain stand age. Operationally in the Kispiox TSA, select seed is used for regeneration where it is available; at the moment this is restricted to lodgepole pine. Between 1998 and 2002, class A seed represented 12 percent of all trees planted. However, due to endemic and epidemic pest problems associated with lodgepole pine, such as Dothistroma needle blight, staff felt it was not appropriate to account for the increased volumes attributed to improved seed progeny. Therefore, no volume gains were assumed from the use of class A seed in the base case.

Having considered the information about class A seed, and the occurrence of epidemic disease concerns in lodgepole pine stands as discussed below and elsewhere in this

document, I accept that the analysis assumptions were appropriate, and I make no adjustments on this account.

2) Dothistroma needle blight

For the past five to six years, lodgepole pine-leading stands throughout the ICH biogeoclimatic zone as well as the transitional CWH zone in the Kispiox, Cranberry and Kalum TSAs have been subject to defoliation by *dothistroma pini* (Dothistroma), a needle blight. The spread of the disease and the intensity of the infection have been facilitated by a series of wet summers. In the summer of 2000, regional forest pathology staff conducted a survey in 100 age class one (20 years of age and younger) lodgepole pine-leading stands to assess the extent of the damage. The results from that survey indicated that at least 10 percent of the trees in more than 60 percent of the stands surveyed were affected by the blight. Additional surveys during the summer of 2001 indicated that the disease has spread further and the symptoms in previously infected stands have intensified. Repeated attacks have led to the failure of entire plantations in some cases. Regional forest pathologist staff believe that the extent and concentration of lodgepole pine stands in the TSA, in combination with the possible implications of global warming, are the main factors responsible for the unprecedented incidence of this foliar disease.

Lodgepole pine stands comprise a total of 35 530 hectares, or 9 percent of timber harvesting land base in the Kispiox TSA. The inventory file indicated that approximately 10 200 hectares of the timber harvesting land base is covered with lodgepole pine-leading stands 20 years of age and younger, which corresponds to 36 percent of the managed stands in the TSA.

For the analysis, BCFS staff developed some possible scenarios to reflect what may happen over time in the affected lodgepole pine-leading stands as a result of the foliar disease epidemic.

In one scenario, it was assumed that one-quarter of all lodgepole pine stands (not just the managed pine stands) would experience 100 percent mortality, and the stands would be replaced by hemlock-leading stands after a twenty year time lag. The sensitivity analysis results indicate that this scenario would result in a reduction in the initial harvest level of about 1.4 percent, to 890 000 cubic metres per year. The long-term harvest level relative to that of the base case was unaffected.

BCFS staff express concern that inadequate coniferous seed source is available on many of the sites currently occupied by pine stands. They note that many of the sites currently occupied by lodgepole pine do have a component of hemlock, but in very low proportions. This may result in it taking much longer than the twenty years assumed in the sensitivity analysis for hemlock to regenerate to those sites. An alternative scenario, then, is that one-quarter of the lodgepole pine-leading stands will die and the sites will regenerate to deciduous species. If this transpires, the stands would be considered unharvestable, given the limited merchantability of deciduous species in the Kispiox TSA at the present time. No specific sensitivity analysis was conducted to test the implications of this scenario, but the results of analysis in which the size of the timber harvesting land base was reduced by 10 percent can be reviewed to determine the possible implications. This analysis suggested a proportional relationship between land base reductions and reductions in the harvest level.

Therefore, reducing the size of the timber harvesting land base by an area equivalent in size to one quarter of that area occupied by lodgepole pine-leading stands, or 2.3 percent of the timber harvesting land base, would likely reduce the initial harvest level to 882 000 cubic metres per year, and the long-term harvest level to 420 000 cubic metres per year.

One additional scenario was evaluated. In this scenario, it was assumed that about 40 percent of the lodgepole pine plantations would fail, and regenerate to mixed hemlock and spruce stands in twenty years time. A further 10 percent would likely fail and regenerate to deciduous-leading stands. Based on the 10 200 hectares of managed lodgepole pine leading stands assumed to be in the TSA, this combined set of outcomes would likely reduce timber supply by 3.2 percent across the entire planning horizon.

Given the extent of stand damage observed during overview flights in the past two summers, regional staff are concerned that the implications of the foliar disease on plantations is greatly in excess of either of these possible scenarios. In addition, staff note that the most recent survey results indicate that even the lodgepole pine stems occurring in partially harvested areas and in mixed species stands are affected by the disease. Therefore, the impacts may be even greater than previously projected.

I have considered the information provided about the Dothistroma needle blight in lodgepole pine stands, and I am extremely concerned about the extent and severity of the disease observed, and the implications for future yields in managed stands in the Kispiox TSA. Further, from the information available, it is difficult to assess the risk posed to timber supply as a result of the impact of this disease on managed lodgepole pine stands. I requested that regional staff conduct some additional surveys subsequent to the determination meeting, in an attempt to perhaps better quantify the impacts on managed stands and subsequently better understand the implications for expected yields.

BCFS staff note that, subsequent to the analysis, they reviewed silviculture records for the TSA, which are believed to provide a more precise estimation of the area of managed lodgepole pine-leading stands in the TSA (that is, stands with more than 50 percent lodgepole pine according to the silviculture label). These records indicate that there are in reality 21 000 hectares of managed lodgepole pine-leading stands. This information further indicates that the impacts of Dothistroma may be much greater than originally predicted.

In response to my request for additional information, aerial surveys of all pine-leading plantations in the Kispiox TSA have now been completed, totalling 21 000 hectares. Results indicate that the foliar disease has indeed spread throughout the TSA. On about 75 percent of the area surveyed, 100 percent of the trees in the stand are affected to some degree by Dothistroma. At the time of the surveys, just under 10 percent of the stands were exhibiting some stem mortality.

Staff indicate that overall, in about 8 percent of the stands, the pine stems seem close to death and there are inadequate remaining coniferous stems to adequately stock the area. A further 35 percent of the area would be considered sufficiently stocked with coniferous species even if the lodgepole pine dies. For the remainder of the area, staff indicate that it is very difficult to assess the impacts of the disease at this point. While acknowledging the high level of uncertainty, regional staff believe that the final potential scenario tested for the determination meeting—in which it was assumed 40 percent of the stands would fail and regenerate to hemlock or spruce, and a further 10 percent would fail and regenerate to

deciduous leading—could be used to approximate the best available assessment of the impact offered by these observations. Using the silviculture estimate of 21 000 hectares of potentially affected stands, this would indicate an impact on timber supply of about 6.5 percent.

Regional staff expect that additional surveys conducted over the next two to three years will provide a much better final assessment of stand impacts and thereby facilitate quantification of timber supply impacts.

I have reviewed the additional information provided, and I accept that the potential implications for timber supply resulting from the Dothistroma infestation are not entirely clear, but potentially quite significant. In the absence of better quantification of the impacts, which I acknowledge is not possible at this time, I will take into account in this determination that timber supply may have been overestimated by about 6.5 percent, and I will discuss this further under 'Reasons for decision'.

3) tomentosus root disease

As mentioned elsewhere in this document, recently conducted studies in the Kispiox TSA identified that volume losses occur in existing stands as a result of tomentosus root disease and that the disease is prevalent throughout the ICH biogeoclimatic zone. While it is understood that the volume losses in existing stands are already accounted for within VDYP, regional staff express concern about the implications for the next rotation. Volume losses in spruce dominated plantations that are established on sites heavily infested with root disease will likely be greater than those suffered in the existing unmanaged stands, as the plantations have a higher concentration of spruce stems than the unmanaged stands, and spruce is the most susceptible host species. Staff indicate that about 12 600 hectares of age class 1 stands (less than 20 years of age) in the ICH biogeoclimatic zone are dominated by spruce. It is not known to what extent these stands are infested, although a recent study of 25 to 30 year old plantations indicated that about 5 percent of the spruce stems were infected with tomentosus. It is also not known to what extent the existing operational adjustment factors applied in TIPSY account for the volume implications.

I acknowledge the concern about spruce-leading managed stands, but I note that there is still too much uncertainty to take this factor into account in this determination. I request that staff continue to investigate the influence of tomentosus root disease in managed stands, such that any new information can be incorporated into future determinations.

- minimum harvestable ages

A minimum harvestable age is an estimate of the earliest age at which a forest stand has met minimum merchantability criteria. The minimum harvestable age assumption largely affects when second growth stands will be available for harvest. This in turn affects how quickly existing stands may be harvested such that a stable flow of timber harvest may be maintained. In practice, many forest stands are harvested beyond the minimum harvestable age due to economic considerations and constraints on harvesting which arise from managing for other forest values such as visual quality, wildlife and water quality.

For stands harvested using clearcut and patch cut, minimum harvestable ages were set at the age at which the stand achieved a minimum volume of 200 cubic metres per hectare. This criterion resulted in minimum harvestable ages of between 55 and 153 years.

For stands subject to partial cutting regimes, minimum harvest volumes were set to 150 cubic metres per hectare at the first harvest entry in the analysis. For the stands within each analysis unit, the minimum volume was multiplied by the number of entries for a particular harvest regime, to determine a minimum harvest volume required to make an analysis unit eligible for harvesting. Where the criteria could not be met, the minimum harvestable age was set at 300 years of age. The minimum harvestable age for cottonwood-coniferous stands was set at 150 years of age.

Sensitivity analysis was conducted to assess the timber supply implications of assuming slightly higher minimum volume criteria for stands on specific portions of the timber harvesting land base, compared to the assumptions in the base case. Increasing the minimum volumes required to 250 cubic metres per hectare for all stands subject to harvesting under clearcut systems reduced the initial harvest level in the base case by about 7.5 percent. Increasing the minimum volumes to 300 cubic metres per hectare for stands subject to clearcut harvesting systems, but only those growing on good and medium sites, reduced the initial harvest level by about 5 percent. However, district staff indicate that the minimum volumes assumed in the base case are a better reflection of current and expected practices than those tested in the sensitivity analyses.

Input received from Skeena Cellulose in Terrace suggested that minimum piece size should also be considered in the estimation of minimum harvestable ages. However, in response district staff note that the criteria used in the analysis provide a good representation of current operational considerations, and in any event, that minimum piece size was shown to be non-limiting in the analysis for the adjacent and quite similar Cranberry TSA.

Having considered the assumptions in the base case, I am satisfied that the criteria used appear reasonable, and I accept that they are reflective of constraints guiding current and expected future operations in the TSA. I note that minimum harvestable ages that will guide future operations can be difficult to determine, and I am satisfied that to the extent possible, this has been reasonably well reflected in the analysis. I therefore make no adjustments for this determination.

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

Expected time for forest to be re-established following harvest

- regeneration delay

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. In timber supply analysis, regeneration delay is used to determine the starting point of tree growth for the yield curves which project volumes over time.

In the Kispiox TSA, current management practices involve planting harvested sites to between 1200 and 1600 stems per hectare and within one season after harvest, with one

year old stock (primarily spruce and lodgepole pine). To reflect this, a zero year regeneration delay was assumed in the analysis for the majority of stands.

District staff indicate that on certain sites previously occupied by hemlock- or balsam-leading stands, ingress from natural seed sources or release of advanced hemlock or balsam regeneration occurs. Due to the ingress, the species composition of a stand at its rotation is not expected to solely reflect the stems planted, but rather is projected to represent a mix of both planted and naturally regenerated species. District staff further note that although the planted stems in a stand begin growth in the first year after harvest, other stems—the natural ingress—do not begin growth until about ten years following harvest. Given that the delayed growth of the ingress stems—which comprise a significant proportion of the stand by the end of the rotation—has productivity implications, staff believed it was important to attempt to reflect this phenomenon in the analysis. These operational considerations were reflected in the timber supply analysis by assuming a 5-year regeneration delay for all sites currently occupied by hemlock-leading stands and those balsam-leading stands growing on poor and medium sites.

Public input was received from several different sources questioning this assumption of a 5-year regeneration delay to account for ingress.

A sensitivity analysis was conducted as part of the timber supply analysis that assessed the implications of adjusting the regeneration delay for all stands to zero years. The results indicated that the short-term harvest level could increase by 3000 cubic metres per year, and the long-term harvest level by 20 000 cubic metres per year. These results suggest that short-term timber supply is not highly sensitive to uncertainty in this assumption.

I have considered the information about the analysis assumptions for regeneration delay, and I note that it is difficult to ascertain whether the assumptions, which were intended to approximate operational conditions, adequately account for the interactions of natural and planted species regenerating on sites. I acknowledge that a 5 year regeneration delay was used in the analysis for some of the stands, when in fact in operational practices, a proportion of the stems begin growth in year zero, and another proportion around year 10.

I note that it is difficult to know with certainty whether the technique and assumptions in the analysis account for operational practices in this regard. I agree that it is appropriate to make some accounting for the productivity implications of the described regime. I am aware that district staff developed this methodology with the intention of reflecting operational practices and I accept for this determination that the methodology is reasonable. I note that an alternative approach of using a much more complex regeneration table to more precisely describe timing of stocking and species composition, may in reality not be any more accurate.

So, for this determination, although I note that there is some uncertainty associated with the analysis assumptions as modelled for regeneration delay, I accept them and make no adjustments.

- not satisfactorily restocked areas

Not-satisfactorily-restocked (NSR) areas are those where timber has been removed, either by harvesting or by natural causes, and a stand of suitable forest species and stocking has

yet to be established. Where a suitable stand has not been regenerated and the site was denuded prior to October 1, 1987, the classification is 'backlog' NSR.

The inventory file showed a total of 1124 hectares of NSR in the timber harvesting land base in the Kispiox TSA. Based on a comparison with ISIS records, it was assumed in the timber supply analysis that 239 hectares of this was already restocked. The remaining NSR was assumed to be restocked over the first ten years of the analysis time horizon.

Current NSR refers to those areas recently denuded and not yet restocked. In the analysis, it was assumed that all current NSR would be restocked within the regeneration delay time limits. District staff confirm that these assumptions are a reasonable reflection of current practices.

At the time of the previous determination for the Kispiox TSA, plans were in place to have all backlog NSR stocked within 5 years. District staff note that this goal has not been accomplished. Funding for the restocking of backlog NSR areas is now limited, and district staff express concern that the remaining areas will not be restocked in the timelines assumed in the base case.

Having reviewed the assumptions applied in the base case around NSR areas. I note that the inability to restock the remaining NSR will act to exert a small, unquantified downward influence on timber supply in the longer term. For this determination, I take into account that long-term timber supply has been overestimated by a small, unquantified amount, and I will discuss this further under 'Reasons for decision'.

I share the concerns of the district staff about the lack of funding to establish coniferous species on those sites suitable for growing timber. While some areas may not meet the requirements of a cost-benefit analysis in terms of treatment, there are likely sites within the TSA where it makes sense to treat and re-establish coniferous species, if the funding were available. I encourage district staff to seek alternative means of funding these activities, as I believe that treating some of these sites better meets the principles of good forest management than leaving them inadequately stocked with coniferous species.

- impediments to regenerating stands

In recent years, there has been reduced funding available for specific silvicultural activities, such as brushing. District staff indicate that lower levels of brushing than historically practiced in 21 to 40 year old coniferous stands may result in some of the sufficiently restocked backlog stands being overcome in the future by deciduous competition. Staff indicate that the stands at risk comprise 9660 hectares, or 3.6 percent of the timber harvesting land base.

A sensitivity analysis was conducted to assess the risk to timber supply of assuming that the volumes in all 21 to 40 year old stands were reduced by 40 percent as a result of the encroaching brush. The sensitivity analysis results showed that the initial harvest level presented in the base case could be reduced by as much as 5 percent on this account.

District staff also express concern that the lack of brushing of these sites may in the long term result in stands that are not harvestable at all due to the conversion over time to deciduous-leading stands. Such a scenario would suggest that the stands would have to be entirely excluded from the timber harvesting land base.

Having considered the information regarding the described impediments to regenerating stands, I concur with district staff that these sites would preferably be treated in order to meet best and responsible forest management practices. The sensitivity analysis results suggest that short-term timber supply may be affected if volumes for all stands in this age class are reduced by 40 percent; however, given that only a portion of stands are likely to experience volume losses as a result of the brush encroachment, I expect that this modelled impact is in excess of what can reasonably be expected to occur. As it is not yet possible to assess the longer term status of the areas, I will not take an impact into account in this determination. However, I request that district staff continue to monitor operational practices in this regard such that the information can be incorporated into the next analysis for the Kispiox TSA.

(iii) silviculture treatments to be applied to the area,

Silvicultural treatments to be applied

I have considered the information regarding silvicultural systems, incremental silviculture activities and commercial thinning, and I am satisfied that the analysis assumptions were appropriate. As a result I will not discuss my considerations of this information in detail in this rationale.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

Timber harvesting

I have reviewed the information regarding the utilization standards, and the decay, waste and breakage factors assumed in the analysis for the Kispiox TSA, and I am satisfied that these factors were appropriately reflected in the timber supply analysis.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production,

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

I have reviewed the information presented to me regarding the analysis assumptions for adjacency and green-up, visually sensitive areas, recreation, community watersheds and water quality and I am satisfied that the analysis has appropriately reflected the values and operational constraints for these factors. As a result, I will not discuss my considerations of these factors in detail in this rationale.

- cultural heritage resources

Cultural heritage resources in the Kispiox TSA include culturally modified trees, trap lines, trails, archaeological sites and traditional use sites.

The Telegraph Trail can be found in the Kispiox TSA and is in the process of being established under the *Heritage Act of B.C.* The Telegraph Trail Management Plan was approved by the district manager in 1995 and details specific management for the trail. A buffer of 100 metres must be left on either side of the trail, in which no harvesting may occur. In the timber supply analysis, 973 hectares were excluded from the timber harvesting land base in order to account for the management of the Telegraph Trail area.

An archaeological overview assessment which identifies sites of potential archaeological significance has been completed. No traditional use studies have yet been completed, and archaeological impact assessments (AIAs) are ongoing.

A review of the AIAs for 20 silviculture prescriptions showed that 90 percent of identified culturally modified trees (CMTs) are proposed for harvest. The majority of these CMTs were modified after 1846. The remaining CMTs that are proposed for retention are included in wildlife tree patches, or are located outside cutblock boundaries.

The Old Kuldo Interpretive Trail accesses an ancient village site within the TSA along the Skeena River. Restrictions on harvesting near this trail are applied in operational practice. However, in the analysis, it was determined that this trail as well as the site itself, were accounted for through other land base exclusions, such as those for riparian areas, and therefore no additional specific exclusion was applied.

First Nations noted in public input that they wish to inventory their cultural heritage resources, and thereafter determine appropriate levels of management. In the input, it was also noted that cultural infrastructure, trails and heritage settings are considered culturally significant, and further noted an interest in protecting cedar for shelter and home territory interests.

District staff note that many archaeological and traditional use sites are located in riparian and wildlife tree patch areas, and have already been excluded from the timber harvesting land base. Staff are uncertain as to the extent and location of remaining as-yet-unidentified resources and sites in the TSA. However, given the prevalent location of the ones already found, in riparian and wildlife tree patches, staff do not expect significant impacts to harvesting operations.

District staff also note some concerns have been expressed by First Nations around ancient village sites. However, no development has occurred in these areas as yet, and staff note that most of the sites are in meadows and hence do not contribute to timber supply in any event. A recently identified 20 hectare area is suggested for special management in any future operations. District staff expect to develop specific management policies for these types of sites in the future. Given the small amount of area identified operationally, I do not expect any impact from this on overall timber supply.

Having considered the information about cultural heritage resources in the Kispiox TSA, I am satisfied that there has been a reasonable accounting of the known resources, and that there are no specific concerns at the present time affecting operations. For this determination, I accept that the assumptions in the analysis were appropriate, and I make no

adjustments in this regard. I look forward to any more detailed information that can be collected prior to the next timber supply analysis for the Kispiox TSA, so that it can be further reviewed and incorporated into a future determination as appropriate.

- pine mushroom habitat

Pine mushrooms are an important botanical forest product that can be found in the Kispiox TSA. The 1996 Kispiox Land and Resource Management Plan (LRMP) includes objectives for the management of pine mushrooms. At the time of my previous determination for the Kispiox TSA, I requested that staff investigate the integration of management for botanical forest products into landscape unit planning.

A study was conducted in 2001 to identify and map specific portions of the most productive pine mushroom habitat in the TSA. The study focussed on stands in the ICH subzones, and in the Small Business Enterprise Program (SBFEP) Date and Helen chart areas, which represent an area totalling 42 994 hectares. The results of the study indicated that 87 percent of the potential pine mushroom habitat inside the study area was located within the timber harvesting land base. Operationally, district staff note that no specific strategies have been developed to date for managing potential pine mushroom habitat. The total area of potential pine mushroom habitat in the timber harvesting land base across the whole of the TSA is unknown, and is expected to vary greatly from one geographic area to another.

Specific accounting for pine mushroom habitat was not incorporated into the base case assumptions; rather, possible timber supply implications were evaluated through sensitivity analysis. Using data from the study and extrapolating it to the entire TSA, two separate estimates were prepared for the amount of the timber harvesting land base that could be classified as potential pine mushroom habitat requiring a specific management regime. In the first area estimate, it was assumed that 4.2 percent of the timber harvesting land base would be subject to management for mushroom habitat, an estimate that excluded patches of potential habitat that were smaller than 3 hectares in size. In the second area estimate, it was assumed that 5.6 percent of the timber harvesting land base would be subject to management.

The same management regime for pine mushrooms was assumed in both cases. This management regime was as follows: one third of the area was assumed to be non-harvestable, and was entirely excluded from the timber harvesting land base; one third was assumed to have no harvesting restrictions and was entirely included in the timber harvesting land base, and one third was assumed to be subject to an alternative silvicultural regime, in which at least 40 percent basal area retention in the harvested stands was required.

The first and smaller estimate of habitat area resulted in full exclusion of 3705 hectares in the analysis. The initial harvest level in this sensitivity analysis was reduced relative to that of the base case by approximately 4 percent, to 865 000 cubic metres per year. The long-term level was reduced by approximately 2 percent to 421 000 cubic metres per year.

The second estimate of habitat area resulted in the full exclusion of 4875 hectares of timber harvesting land base. In this case, the initial harvest level was reduced by the same amount, and the long-term level reduced by 3 percent to 417 000 cubic metres per year. BCFS staff

indicate that the reduction in harvest level is primarily as a result of the lost timber supply contribution of the area fully excluded from the timber harvesting land base.

District staff indicate that current practice for the management of pine mushroom habitat include partial harvest of some areas, clearcut of other areas and complete reserving of some areas, as was reflected in the sensitivity analysis. However, staff believe that the areas reserved often overlap with areas excluded from the timber harvesting land base to account for other resource objectives, and therefore staff are uncertain as to whether reflecting the full incremental impact of the area as reserved in the analysis is reasonable. They note that Skeena Cellulose in its operations has placed some pine mushroom habitat into wildlife tree patches, which further substantiates the possibility of overlap with other reserved areas.

District staff inform me that the Small Business Forest Enterprise Program (SBFEP) has committed to management of pine mushroom habitat in its operating area.

District staff hope to complete an inventory of pine mushroom habitat for all of the ICH and CWH subzones in the TSA, and as well research the silvicultural systems which would best provide for the long-term viability of the pine mushroom resource.

Having considered the information about pine mushroom habitat in the Kispiox TSA, and the assumptions tested in these sensitivity analyses, I have the following observations. Pine mushrooms are undeniably an important botanical forest product, the habitat for which must be considered in forest management and planning. I am encouraged by the study conducted in the Kispiox TSA, as I note that completion of such a study to attempt to better reflect the distribution of habitat and expected management, and the subsequent extrapolation of the results in a sensitivity analysis, are useful steps towards describing the appropriate timber supply implications of managing for the resource. Obviously, some level of constraint should appropriately be applied to a percentage of the land base to manage for pine mushroom habitat. The remaining uncertainty is related to the amount of habitat present in the timber harvesting land base, and the exact management regime which will apply to this area. I am not convinced that the results of the small study conducted in the Kispiox TSA can necessarily be extrapolated to the entire TSA, in particular given that the study focused on the most productive pine mushroom sites.

For this determination, and in consideration of the information provided, I am satisfied that it is appropriate to take into account some level of constraint to timber supply on account of this factor. Of further significance in my considerations is the fact that a key objective cited in the Kispiox LRMP HLP is *'to maintain mushroom resources and provide opportunities for sustainable harvesting of mushrooms'*. In the absence of complete studies that can be directly correlated to the entire land base, I must apply judgement in my consideration of the appropriate level of constraint that meets the LRMP objective. Given the possibility that pine mushroom habitat can at least be partly accommodated through reserves also accommodating management of other resources, and the fact that the area subject to study was likely the most productive mushroom habitat in the TSA, I believe that the impacts suggested by the sensitivity analysis likely represent the upper end of the range. Therefore, I will take into account that timber supply in the short term has been overestimated in the base case by up to 4 percent, and in the longer term by up to 2 or 3 percent on this account, and I will discuss this further under 'Reasons for decision'.

- riparian habitat

Riparian habitats occur along streams and around lakes and wetlands. The Forest Practices Code requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting, in order to protect riparian and aquatic habitats. Stream classes (e.g. S1) described in the *Riparian Management Area Guidebook* are determined based on presence of fish, occurrence in a community watershed and average channel width criteria. The stream class is used to estimate RRZ and RMZ requirements.

The Kispiox LRMP higher level plan describes an objective to maintain riparian areas, and also gives direction on floodplain management. Floodplain mapping information was available for use in the analysis. District staff note that the requirements under the Forest Practices Code for the management of riparian areas generally meet the higher level plan objective, and therefore no specific additional requirements were modelled. The district manager has issued policy direction to licensees that represent an interpretation of LRMP objectives for floodplain management. Specific floodplain exclusions were applied to reflect this direction in the analysis.

In 1999, a Geographic Information Systems (GIS) analysis was completed, in which streams were classified based on TRIM features and slope. Fish inventory information was incorporated into the analysis where available. Where exact stream classification was uncertain, some of the S2 and S3 streams, and some of the S3 and S4 streams, were grouped together for the analysis.

The Babine Land and Resource Use Plan (LRUP) also provided direction for the management of riparian habitat for the area known as Treatment Unit 1 – Riparian Ecosystems. The LRUP directed that no harvesting should occur within the treatment unit, and this direction is being followed operationally. In the analysis, Treatment Unit 1 was entirely excluded from the timber harvesting land base.

A total of 11 304 hectares were excluded from the timber harvesting land base to account for management practices in riparian areas.

Public input received from a consultant on the analysis report suggested that the levels of retention on S5 and S6 streams were underestimated in the analysis. The consultant stated that reserve zones are commonly placed around S5 and S6 streams, and cited data from a study. District staff indicate that the level of retention noted in the study has been addressed in the analysis through the accounting for wildlife tree patches and unharvested volume retention, as discussed under *stand level biodiversity*. Staff also note that the assumptions in the analysis for RMZs and RRZs reflect current operational practices. However, they indicate that the analysis assumptions for floodplain areas may indeed be slightly more constraining than current practice, although it is difficult to assess given the lack of harvesting operations currently occurring in these areas.

Having considered the information about the analysis assumptions around riparian management practices, I am pleased to note that a much more localized approach was used in this analysis in comparison to the previous analysis for the Kispiox TSA, and that this has resulted in significantly improved information. I am aware that the retention assumed in the analysis for riparian areas is intended to approximate operational practices, and therefore the grouping in the analysis of S2 and S3 streams, and S4 and S5 streams,

although approximate and not precisely reflective of actual operations, do provide for a reasonable accounting of this factor at this time.

Having reviewed the assumptions in the analysis to account for management practices in riparian habitat, I am satisfied that there has been a reasonable reflection of management practices in riparian areas, and I make no adjustments for this determination.

- wildlife habitat

The forests of the Kispiox TSA provide habitat for a broad diversity of wildlife species, including grizzly and black bear, mountain goat, black-tailed deer, cougar, wolf, marbled murrelet, northern goshawk, bald eagle, Keen's long-eared myotis and tailed frog.

Following are my considerations of some of the provisions made in the analysis for wildlife species.

1) identified wildlife

'Identified wildlife' refers to species at risk (red- and blue-listed) and to regionally significant species which are potentially affected by forest management activities and which may not have been adequately accounted for with existing management strategies, such as those for biodiversity, riparian management, ungulate winter range or through the application of other forest cover constraints. Species at risk as defined under the Forest Practices Code also include those species that are not considered at risk provincially but which have regional populations that may be threatened. The intent is that by addressing the habitat needs of 'regionally important wildlife' early on, the possibility that they will become listed provincially as threatened or endangered at a later date may be avoided.

Volume I of the IWMS was released in February 1999 and details several species which may occur and which require future consideration in the TSA, including bull trout, tailed frog, trumpeter swan, northern goshawk, fisher, grizzly bear and mountain goat. Volume II, which has yet to be released, may identify additional species. The species identified in Volume I will be managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures (GWMs), or through other management practices specified in higher level plans.

In the Kispiox TSA, no WHAs have yet been established, and GWMs have not yet been implemented. As a result, no specific accounting for the management of identified wildlife species was made in the timber supply analysis. Ministry of Water, Land and Air Protection staff note that work to identify potential WHAs is ongoing, and that some WHAs, such as for tailed frog, will likely be proposed for the Kispiox TSA in the future.

The Province has committed to implementation of the IWMS and limitation of short-term timber supply impacts to one percent across the province.

Given the species known to be present in this TSA, I expect that the future establishment of WHAs will indeed reduce the timber harvesting land base by up to one percent described by provincial policy. I will thus take into account in this determination a one percent impact on timber supply, which I believe accommodates WHAs expected to be established in the foreseeable future.

I have considered the risk posed to mid- to long-term timber supply on this account and I will discuss this further under 'Reasons for decision'.

2) ungulate habitat

Two objectives from the Kispiox LRMP higher level plan relate to ungulates, as follows: to maintain natural ecosystems and habitat to sustain viable populations of all native wildlife species within their natural ranges, and to provide for sustainable harvest of big game species.

Mountain goat suitability mapping has been conducted in the TSA. District staff indicate that the areas identified are largely canyons and alpine areas, with very little overlap with the timber harvesting land base. Moose winter range suitability mapping is in progress, and management strategies may apply to this area to address LRMP objectives. However, district staff do not anticipate significant timber harvesting land base impacts. One deer winter range zone is identified in the LRMP, lying at the confluence of the Natlan and Suskwa Rivers, and comprising 0.6 percent of the timber harvesting land base. One strategy arising from the LRMP to address the objectives in the higher level plan indicates that 15 percent of the stands in identified deer winter range should be managed at longer rotations of 150 years, to provide for thermal and snow interception. In addition, the strategy recommends that at least 40 percent of those stands must be maintained at 150 years of age or older at all times.

However, Ministry of Water, Land and Air Protection staff indicated that modelling only the second component of this strategy explicitly in the analysis should sufficiently reflect current management for ungulate habitat needs. Therefore, management of some stands at rotations longer than 150 years was not explicitly modelled in the analysis. To address the second portion of the strategy, a forest cover constraint was applied to the deer winter range area, whereby at least 6 percent of the stands were maintained at 150 years of age or older at all times.

Operationally, no development is currently proposed within the deer winter habitat zone by licensees, and district staff indicate that licensees recognize the importance of managing for mule deer habitat in this area.

District staff indicate that several additional high value deer winter range areas not identified in the LRMP exist in deciduous forested portions of the TSA. Staff indicate that these areas were largely excluded from the timber harvesting land base in the analysis under other reductions.

I have considered the information about the assumptions made in the analysis to account for the management requirements in ungulate habitat. I am satisfied that the information used represents the best available information at this time, and provides a reasonable accounting for current management. As such, I make no adjustments for this factor.

- stand level biodiversity

Biodiversity is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems and the evolutionary and functional processes that link them. Under the Forest Practices Code,

biodiversity in a given management unit is assessed and managed at both the stand and landscape levels.

Stand level biodiversity management includes retaining reserves of mature timber, or wildlife tree patches (WTPs), within or adjacent to cutblocks to provide structural diversity and wildlife habitat. The *Landscape Unit Planning Guide: Policy and Procedures* document makes recommendations for percentages of area to be retained in WTPs, based on specific assumptions about the land base.

One of the objectives of the Kispiox LRMP higher level plan is to retain the structural diversity of managed forests. One strategy developed to meet this objective, stipulates that 50 percent of harvest units will incorporate new forestry concepts.

A review of 179 cutblocks harvested between 1997 and 2000 indicated that 10.9 percent of the forested area within cutblocks is retained as WTPs and other reserves. Further review of data in current Forest Development Plan (FDP) submissions indicated a 10 percent WTP retention.

Staff further reviewed a selection of WTPs in the field, in order to assess the composition of the area retained. It was found that 55 percent of WTPs are typically small unmapped areas of either problem forest types, environmental sensitivity or inoperable forest (steep terrain, rock outcrops or below minimum harvest volume). The remainder of the area is retained specifically to meet stand level biodiversity requirements. It was determined to be appropriate to exclude all of this area as WTPs in the analysis due to the small nature of the unmapped areas which precluded their capture under any other exclusions applied in the analysis. Therefore, in the analysis, 32 180 hectares or 10.9 percent of the forested land base were excluded to account for areas retained in wildlife tree patches.

Subsequent to the analysis, district staff re-reviewed the data upon which the exclusions were based. This review uncovered a small overlap of WTP area with terrain class IV exclusions, therefore indicating the timber harvesting land base had been underestimated by 0.2 percent.

Public input received from Skeena Cellulose Industries suggested that accessible excess area in WTPs may only be deferred from harvest in the short term. District staff note, however, that there is no indication within licensees' operational plans that any of these areas would be harvested in the future. Staff further note that the location and composition of the areas do not suggest short term deferral.

Having reviewed the information about the assumptions in the analysis to reflect current management for stand level biodiversity, I am satisfied that the exclusions are based on clear data and methodology, and that the exclusions have provided a reasonable accounting of areas reserved from harvest. I believe that the best available information has been used. I accept that the identified overlap between the exclusions for wildlife tree patches and the excluded terrain class IV areas does indicate that the timber harvesting land base was underestimated by 0.2 percent. However, as discussed under *environmentally sensitive areas*, I am taking into account in this determination an underestimation of timber supply by up to 6 percent as a result of the exclusions applied in the analysis for class IV terrain. I am satisfied that my accounting for that factor also addresses any underestimation resulting from overlaps on this account, and I make no further adjustments.

- landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. Managing for biodiversity is based in part on the principle that this—together with other provisions in the Forest Practices Code, such as riparian management, maintenance of wildlife trees, and other forest cover objectives as discussed throughout this document—will provide for the habitat needs of most forest and range organisms. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species dependent on, or strongly associated with, old-growth forests. The delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy.

The *Landscape Unit Planning Guide* outlines three biodiversity emphasis options (BEOs)—lower, intermediate and higher—which guide the establishment of biodiversity management objectives for a landscape unit. The guide outlines the proportions of each subregional planning area that should be assigned to each of the three BEOs. The proportions in lower and intermediate biodiversity emphasis can range from 30 to 55 percent, but the average is approximately 45 percent of the area in lower, 45 percent in intermediate, and 10 percent in the higher BEO landscape units. The policy generally followed for timber supply analyses when landscape units and BEOs have not been formally established is to model the distribution of BEOs using a weighted average forest cover requirement. Landscape unit boundaries were drafted in the Kispiox TSA in 1999, and draft BEO assignments of 10 percent of the area in high, 49 percent in intermediate and 43 percent in low were made. However, because landscape units have not been formally established in the TSA, the weighted average forest cover requirement approach was followed in the base case.

The forest cover requirements were applied at the biogeoclimatic variant level within each landscape unit, as a minimum percentage of the productive forest land base which must be retained in stands meeting the requirements for old and mature forests. *The Landscape Unit Planning Guide* permits old forest requirements for areas with low BEOs to be met within three rotations, and describes no mature forest retention requirements for these areas.

Also in the base case, a rate of disturbance was assumed in the productive forested area outside the timber harvesting land base to approximate natural disturbance regimes for the Kispiox TSA.

Four sensitivity analyses were conducted to assess the timber supply implications of varying the landscape level biodiversity assumptions. In the first, the draft BEO assignments were used in place of the weighted average requirement applied in the base case. There was no impact on the base case harvest projection from adjusting these assumptions. In the second sensitivity analysis, the draft BEO assignments were again applied, and in addition the old seral retention level was required to be met immediately. In this instance, the short-term and long-term harvest levels were decreased very slightly, by 0.6 percent and 0.7 percent, respectively.

In the third sensitivity analysis, the draft BEOs were again assigned, and full mature as well as old seral retention objectives were required to be met immediately. In the fourth

sensitivity analysis, full early seral requirements were applied as well. In both of these analyses, timber supply in the short and long term was little impacted relative to the base case. These sensitivity analyses indicate that timber supply in the Kispiox TSA is not overly sensitive to uncertainty in landscape level biodiversity requirements.

The Kispiox LRMP higher level plan includes an objective of maintaining or enhancing biodiversity over the planning area. One strategy developed to meet that objective is to ensure that 12 percent of the area in medium-sized watersheds will be managed for old growth values through preservation and conservation. To reflect this in the base case, a forest cover objective was applied in which 12 percent of the forested area in each landscape unit was required to be greater than 200 years of age at any one time. The impact of achieving this objective was assessed in the analysis and it was determined that it did not significantly affect timber supply.

Several specific management strategies for landscape level biodiversity have arisen for the area under the Babine LRUP, which encompasses 16.1 percent of the timber harvesting land base. Five sub-drainages have been delineated to facilitate the management of early and old seral forest objectives, within the Crown forested area and by biogeoclimatic zone. Forest cover objectives were applied in the analysis to reflect the operational requirements for maximum allowable disturbance regimes guiding current practices.

Management objectives and strategies for Treatment Unit 2 under the Babine Local Resource Use Plan include to maintain unmanaged stands of old growth, and to maintain linkages with other areas. As discussed under Babine Local Resource Use Plan, this treatment unit has been designated as a no harvest zone and was entirely excluded from the timber harvesting land base in the analysis.

A special management zone is also delineated under the Babine LRUP. For this area, 4636 hectares in size, at least 30 percent of the stands in the Crown forested area are required to be 140 years of age at all times. A forest cover objective was applied to this area in the analysis to reflect this requirement.

Input received from Bell Pole commented on the modelling of the requirement for 12 percent old growth retention, noting that the requirement is not a legal one, but rather a strategy developed to address the LRMP objectives.

Having considered the licensee's input, I agree that the strategy itself is not legally required, but as mentioned elsewhere in this rationale under *Kispiox Land and Resource Management Plan*, the strategy does provide a reasonable means of achieving the higher level plan objective in the interim while landscape unit planning is being completed. District staff note that the licensees are managing to these requirements operationally. To date, staff note that it has not impacted operations in the TSA, although it may in the future affect operational development in two landscape units with a high proportion of area in the Interior Cedar Hemlock (ICH) biogeoclimatic zone. In the absence of an alternative strategy which also meets the objective, I accept that the approach taken in the analysis provides a good approximation of the management requirements to address this objective, and I make no adjustments in this regard.

With respect to the other assumptions regarding landscape level biodiversity, I am satisfied that the best available information was used and that the objectives were appropriately reflected in the analysis.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

Land Use Planning

- Kispiox Land and Resource Management Plan

The Kispiox Land and Resource Management Plan (LRMP) was approved by Cabinet in April 1996, and key objectives from it were legally designated in a higher level plan in April 1997.

The LRMP included the development of special management zones to maintain significant values in community watersheds and in four specific areas in the TSA. As well, recommendations were made for four new protected areas that have since been designated as provincial parks. A fifth area has been designated as an ecological reserve.

District staff indicate that current management practices in the TSA are consistent with the Kispiox LRMP objectives. The timber supply analysis incorporated assumptions to account for current management practices, and the provisions of the LRMP and HLP, as discussed under the appropriate sections of this rationale.

District staff note that a monitoring committee was established for the Kispiox LRMP. The committee's first report was published in June 2001. Among other items, the report recommended that landscape unit planning and access management planning be undertaken and that strategies be written for those objectives without strategies. The report also noted some information gaps.

Public input received from licensees noted that the strategies referred to in the timber supply review documentation were not requirements under the higher level plan, but rather suggested strategies to meet objectives. While I agree with the stated input, I also note that the strategies used to formulate analysis assumptions do represent an interpretation of current practices, and represent an attempt to reflect some means of achieving the objectives outlined in the higher level plan. The objectives must be met in the TSA, and alternative means of meeting these objectives have not been developed or approved. For this determination, I accept that the strategies modelled represent the best available information, and I make no adjustments in this regard, subject to the discussions held under the various factors in this rationale. I also note that any alternative strategies to meet the higher level plan objectives that are developed by licensees or others over the term of this determination can be considered at the time of the next determination for the Kispiox TSA.

- Babine Local Resource Use Plan

The Babine River Interim Local Resource Use Plan (LRUP) was completed in June 1994 and was signed off by the BCFS Bulkley and Kispiox district managers, and the Regional Director of the former Ministry of Environment, Land and Parks.

A monitoring committee originally formed in 1994 now consists of members of the BCFS, Ministry of Water, Land and Air Protection, Ministry of Sustainable Resource Management and the Department of Fisheries and Oceans. Operational plans developed for the area under the plan must consider the objectives of the LRUP.

In the timber supply analysis, specific provisions of the LRUP were modelled. Forest cover constraints for old growth and early seral retention were applied to 16.1 percent of the timber harvesting land base. Other areas were excluded to account for other provisions of the plan, and these exclusions are discussed under various factors in this document.

Having considered the information about the Babine River Interim Local Resource Use Plan, I accept that the provisions of the plan as they represent current practices were appropriately reflected in the timber supply analysis.

First Nations considerations

With respect to First Nations issues in the Kispiox TSA, I am aware of the following:

The Gitxsan, Wet'suwet'en, Gitanyow, Nat'oot'ten (Lake Babine Nation), Nisga'a and Tsimshian are six First Nations claiming territorial rights within the Kispiox TSA.

Over 90 percent of the TSA falls within the Gitxsan treaty claim area.

On May 3, 2002, the Gitxsan filed a Petition to BC Supreme Court for a judicial review of the Minister of Forests' decision to grant his consent to the transfer of control of Skeena Cellulose Inc. to North West BC Pulp and Timber Co. The Gitanyow and Lax Kw'alaams have filed similar Petitions, claiming there was inadequate consultation. These Petitions were heard in September and October, 2002.

The Wet'suwet'en Nation, Gitxsan, Gitanyow, Lake Babine Nation, Tsimshian and Nisga'a Nations were sent copies of the Data Package and Information Report in October, 2000, and copies of the analysis report and public discussion paper in May, 2002. District staff held a meeting with the Gitxsan chiefs on June 4, 2002. Further, I met with the Gitxsan chiefs subsequent to this determination meeting, on June 26, 2002.

Input was received from both the Gitxsan and Wet'suwet'en First Nations regarding the timber supply review.

The Wet'suwet'en stated that they did not agree with the timber supply review process. They felt that the economic needs of the forest sector are given priority, and that inadequate funding and increasingly streamlined regulatory controls have reduced the ability of the Wet'suwet'en to influence the management of natural resources and to ensure protection of their traditional uses in a manner that reflects their vision. The Wet'suwet'en further indicated that they estimate 60 percent of their cultural heritage has been destroyed by activities such as forestry, and that the loss of forested areas within their asserted traditional territory has significantly affected their culture. They express concern that while they are trying to affirm their rights through the BC Treaty process, resource extraction activities continue to daily remove culturally important resources.

With respect to the Wet'suwet'en assertions, I am aware that the Crown has legal obligations to avoid unjustifiable infringement upon aboriginal rights. Ongoing dialogue around operational plans offer an important venue for information exchange so that forest operations can be located and designed to avoid infringement. These discussions are outside of my responsibility, but I am aware that they are a normal part of the operational plan approval process. At this time I have no information flowing from the ongoing operational planning process to indicate that a change in the AAC of any particular amount would address the concerns expressed by the Wet'suwet'en. Neither do I have information

to indicate that those concerns cannot be addressed during planning and execution of forest operations. If information is submitted that clearly suggests otherwise, I will consider it in future determinations.

The Gitxsan submitted a detailed report in response to the timber supply analysis report, and also submitted additional input subsequent to my AAC determination meeting with BCFS staff. In their input, the Gitxsan indicate that the province has likely infringed on Gitxsan aboriginal rights and title by failing to set an AAC that reflects the timber profile being used by licensees and by failing to regulate licensee's cut so that it matches the profile. The input further contends that the infringement has occurred because a failure to manage and conserve has led to a degraded forest that may have insufficient viable timber for Gitxsan Houses to develop a sustainable, self-sufficient economy in the future.

I understand that the Gitxsan are particularly concerned about a sustainable self-sufficient economy for their Houses. However, my determination is not related to the allocation of the AAC to particular licences or programs but with the overall sustainability of the timber supply from the TSA. I particularily note that my determinations and the timber supply analyses that support them have as a core objective the achievement of economically sustainable timber supply, and I feel that this objective has been met in this determination. Similarly, I believe that if the TSA-level supply is sustainable, the licences provided under that AAC can be administered sustainably. I encourage continued dialogue on these issues to ensure that sustainable timber supply-related opportunities are available in the area; however, I am not able to make adjustments with respect to those issues in this determination.

In two letters submitted subsequent to the determination meeting and my discussions with the Gitxsan on June 26, 2002, the Gitxsan insist that the Chief Forester has a further obligation to consult. Ongoing concern is expressed about the economic viability of the timber remaining in the Kispiox TSA.

I acknowledge that during the 1980s, as indicated in the Gitxsan report, spruce and pine may have contributed a larger percentage to harvests than those species contributed to the inventory. However, the harvest and inventory contributions of those species have been closely in line over the last decade. The potential for concentration of harvests in more valuable forest types is always a concern in the determination and administration of timber harvest levels, since doing so can lead to an inventory of low net value forest stands. The Gitxsan submit that past harvesting has already led to this result. I acknowledge uncertainties related to the economic viability of some forests included in the timber harvesting land base, as discussed under *economic and physical operability* and "Reasons for decision". I do not dispute that the contribution of sawlogs to the harvest in the TSA may have declined over the last 15 years. However, the Gitxsan assertion that the timber on the current timber harvesting land base is in general uneconomic to harvest, and cannot support a sustainable forest economy, is not conclusively supported by the information in their submission. Further, I note that the inputs used for the BCFS timber supply analysis were based on the most currently available information, including a review of recent operations. While some of those inputs may require assessment and adjustment in determining the AAC, as reflected throughout my considerations, I believe that overall those inputs reflect operational realities.

I am aware that the Gitxsan are participating in the West Babine Sustainable Resource Management Planning process in the Kispiox TSA. Participation in this and similar planning processes can potentially help to identify important traditional use sites, and define management practices for non-timber forest products and traditional uses. These processes will then serve to further inform future AAC determinations.

A small portion of the Nass Wildlife Area, referenced under the Nisga'a Final Agreement (NFA), overlaps with the Kispiox TSA. This portion falls within the headwaters of the Cranberry River watershed. The NFA describes decision making processes and wildlife management rules for the Nass Wildlife Area. Kispiox District staff have informed me that wildlife management provisions within the Nass Wildlife Area have not affected timber harvesting to date.

I have documented other considerations related to First Nations under *cultural heritage resources* above.

In conclusion, I have considered all of the information presented to me relating to First Nations interests. As noted above, I believe that some First Nations interests have been addressed through land base exclusions (see *cultural heritage resources*) and some others can be addressed in the design, location and scheduling of operations with no timber supply impacts. In some cases, for example ensuring that the timber resource is not degraded in value, I believe that good forest conservation and management are consistent with First Nations interests. I realize that the timber supply analysis has not addressed some asserted rights and title interests to the extent desired by First Nations. However, the nature, scope, and geographical location of potential rights and title remain inconclusive. At this time I am uncertain as to whether those interests would logically extend to an impact on the AAC. Based on these conclusions, I will make no related adjustments for this determination.

I will consider any new information, including any decisions on treaty negotiations with the First Nations that are undertaken by government, at the time of my next AAC determination. If new information contradicting any of my conclusions becomes available during the effective term of this determination, I may re-visit this determination prior to the required time.

In the meantime, as I have noted in my 'Guiding Principles,' the AAC that I determine should not in any way be construed as limiting the Crown's obligations as described in court decisions with respect to aboriginal rights and title. In this respect, the AAC that I determine does not prescribe any particular plan of harvesting activity within the Kispiox TSA by requiring any particular area to be harvested or to remain unharvested. My AAC determination is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

As I make my AAC determination, I am mindful of the responsibility of other statutory decision makers to administer the determined AAC in a manner consistent with other legislation and relevant court decisions respecting the interests of First Nations.

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

Alternative rates of harvest

The nature of the transition from harvesting old growth to harvesting second growth is a major consideration in determining AACs in many parts of the province. In the short term, the presence of large volumes of older forests often permits harvesting above long-term levels without jeopardizing the sustainability of future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

Several harvest forecasts would have been possible for the Kispiox TSA, given the current management regime and assumptions made in the analysis. The assumptions for these options are discussed in detail in the *May 2002 Kispiox Timber Supply Area Analysis Report.*

One alternative harvest forecast indicated a decline from the initial harvest level presented in the base case to the long-term harvest level at a rate of 12 percent per year rather than the 10 percent per year illustrated in the base case forecast. This alternative showed that the initial harvest level could be increased to 967 000 cubic metres per year (7 percent above the base case initial harvest level) while reaching the same long-term harvest level one decade earlier than in the base case. From this alternative harvest flow, I note that an initial harvest level closer to the level of the current AAC would have been possible if greater than 10 percent declines per decade were considered acceptable.

A second alternative harvest forecast showed the impact of implementing the Kispiox Harvest Level Committee recommendation of reducing the harvest level by 2 percent per year until the long-term harvest level is reached. This harvest flow showed that if this rate of decline were acceptable, an initial harvest level 8 percent higher than that in the base case, or 977 585 cubic metres per year, could be achieved, and that the long-term harvest level would be reached four decades earlier than shown in the base case.

As mentioned earlier in this document under Base case for the Kispiox TSA, I have reviewed the alternative harvest forecasts provided, and I am satisfied that the harvest flow presented in the base case provides the best forecast of the available timber supply, and provides a suitable basis from which to evaluate the assumptions applied in the analysis.

Community implications

A socio-economic analysis was conducted as part of the timber supply analysis, in which the impact of timber supply adjustments on local communities and the provincial economy was assessed. The assumptions and findings of the socio-economic analysis are presented within the *May 2002 Kispiox TSA Timber Supply Analysis Report.* I have reviewed the information in the socio-economic analysis and I am mindful of the implications to

communities of variations in the harvest level of the Kispiox TSA. I am also aware that recent actual harvest levels in the TSA have been below the level of the current AAC.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

Timber processing facilities

Kitwanga Forest Products, Kispiox Forest Products and North West BC Timber and Pulp Limited all have mills in the Kispiox TSA. The Kispiox Forest Products Mill was closed for 1999 and 2000 but reopened early in 2001. Bell Pole operates as a licensee in the TSA but does not have a timber processing facility within the TSA boundaries.

North West BC (NWBC) Timber and Pulp Limited purchased Skeena Cellulose in February 2002. The mill at Carnaby, within the TSA has been closed since February 2001. The whole log chipper is expected to reopen early in 2003.

No new large timber processing facilities have been proposed or are anticipated in the Kispiox TSA.

I have reviewed the information regarding timber processing facilities, and I am aware of the reliance of timber processing facilities on the volume harvested in the Kispiox TSA.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia,

Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). The letter and memorandum include objectives for forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

I note that I take the Kispiox Land and Resource Management Plan (LRMP) and the higher level plan as an important expression of local objectives for the Kispiox TSA.

Having reviewed the information about the analysis assumptions, I conclude that what was done is consistent with the direction provided in the Minister's letter, and I further note that my decision will be consistent with this direction.

The Minister's memorandum addressed the effects of visual resource management on timber supply. In it, the Minister asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply.

I am satisfied that the assumptions regarding visual resource management in the TSA, and reflected in the analysis, are consistent with the direction in the Minister's letter.

I have considered the contents of the letter and memorandum in my determination of an AAC for the Kispiox TSA. I am satisfied that this determination is consistent with the Minister's direction as expressed in these documents.

Local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives. The BCFS provided a number of opportunities for public input through the timber supply review process for the Kispiox TSA, including opportunities to review the data package and the timber supply analysis and to respond to the public discussion paper. Numerous open houses and meetings were held to obtain feedback. In response, submissions were received from licensees, interest groups, First Nations and individuals. A summary of this public input is reproduced in full as Appendix 5.

Public input was received in response to the timber supply review process for the Kispiox TSA. While I note that space limitations do not allow me to address all of the input in this document, I have attempted to respond to some input under the appropriate factors. As with all AAC determinations, regardless of whether the input is specifically discussed in this document, I have considered all of the public input received in my determination of an AAC. Some of the opinions expressed in the input relate to items outside my mandate to take into account as chief forester under my legislated authority for an AAC determination (section 8 of the *Forest Act*). For example, suggestions about allocation of timber harvesting rights are within the mandate of the Minister of Forests and not the Chief Forester. Opinions were expressed from various stakeholders recommending that the AAC be increased, maintained or decreased. While I acknowledge the opinions expressed, I note that any decision that I make on the harvest level for the TSA must be predicated on sound information, and I cannot speculate about land use or other decisions which have not been taken by government. As also mentioned elsewhere in this document, I am satisfied that the timber supply analysis provides me with a sound basis on which to assess the timber supply for the TSA.

As mentioned above, local objectives have been an important consideration in my determination of an AAC for the Kispiox TSA.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Unsalvaged losses

- accounting for non-recoverable losses

Unsalvaged losses are timber volumes destroyed or damaged by causes such as fire and disease that are not recovered through salvage operations. There are a number of parasites, fungi or plants that can kill trees or degrade the quality and value of logs.

Estimates for unsalvaged losses account for epidemic (abnormal) infestations that are not incorporated into yield estimates used in the analysis. Timber volume losses due to insects and diseases that normally affect stands (endemic losses) are accounted for in inventory sampling for existing timber yield estimation or though other methods. Losses associated with second-growth stands are addressed by application of operational adjustment factors (OAFs) as noted under *volume estimates for regenerated stands*.

In the analysis, reductions were applied to the harvest forecasts to account for unsalvaged volume losses resulting from wildfires, windthrow, balsam bark beetle and *Inonotus tomentosus* (tomentosus) root disease.

In order to estimate losses from fire, staff reviewed wildfire data from the inventory file and the Northwest Fire Centre for a 21-year period in total. The area upon which salvaging occurred was taken into account, and an estimate for unsalvaged volumes of 12 105 cubic metres per year was applied to the harvest forecast.

Windthrow data for the period between 1971 and 1991 was similarly reviewed, and resulted in an estimate of unsalvaged volume of 735 cubic metres per year, which was also applied to the harvest forecasts.

In my previous determination for the Kispiox TSA, I requested that staff derive a better estimate of volume losses resulting from balsam bark beetle infestations in stands. A study was conducted by the regional entomologist to attempt to address this request. The study evaluated balsam-leading stands 101 years of age and older in the Engelmann Spruce Subalpine Fir (ESSF) and ICH biogeoclimatic zones. Harvest billing summaries were reviewed to determine salvaged volumes. Using the results of the study, volume losses of 138 525 cubic metres per year were assumed in the first decade of the analysis horizon. As losses were expected to decline over time as the natural balsam stands were harvested, this value was reduced by 10 percent per decade until it reached the level of 13 850 cubic metres per year in the tenth decade. It was maintained at this lower level for the remainder of the analysis horizon.

A cruise-style audit was also completed as part of the study but the results were not compiled until after the timber supply analysis report was released. The compiled results of the audit are also discussed under *volume estimates for existing stands*.

A tomentosus study was also conducted as part of the preparation of data for the analysis report in 12 100 hectares of spruce-leading stands older than 80 years of age. The results of this study indicated extensive unsalvaged volume losses in existing stands as a result of tomentosus. These losses were accounted for in the analysis through the application of a constant 52 000 cubic metre per year reduction to the harvest levels over the entire analysis time horizon.

Subsequent to the release of the analysis report, the results of the balsam bark beetle study and the tomentosus study were revisited, and the stand volumes observed in the studies were compared to those calculated from VDYP. BCFS staff, and staff from the Terrestrial Information Branch of the Ministry of Sustainable Resource Management, have reviewed this and other data, and now indicate that the losses in unmanaged stands due to both balsam bark beetle and tomentosus are in fact already accounted for within the volume estimates calculated by the growth and yield model VDYP.

Having considered the information about the accounting for unsalvaged losses in the Kispiox TSA, I have the following observations. I am satisfied that the accounting for wildfire and windthrow losses are based on a reasonable methodology, and as a result that the analysis assumptions for these factors were appropriate. With respect to both the assumed balsam bark beetle losses, and those resulting from tomentosus, I accept that the VDYP model already accounted for the volumes lost. As a result, I accept that short-term timber supply was underestimated in the base case by a total of 190 525 cubic metres per year. There is still some uncertainty regarding the appropriate losses to assume for managed stands, and the extent to which these losses are accounted for within managed stand yield estimates in the mid to long term. Due to the uncertainty, there is also a possibility that mid- to long-term timber supply has also been underestimated, although by a much smaller amount. I will discuss my considerations of this further under 'Reasons for decision'.

I recommend that staff continue to monitor the impacts of balsam bark beetle and tomentosus in both existing and managed stands, so that the data can be used in future timber supply analyses.

Reasons for decision

In reaching my AAC determination for the Kispiox TSA, I have considered all of the factors presented to me, and I have reasoned as follows.

The base case harvest forecast indicated that an initial harvest level of 903 000 cubic metres per year (17 percent lower than the current AAC), could be maintained for one decade, followed by a series of declines of approximately 10 percent per decade until the harvest level reached a long-term level of 430 000 cubic metres per year in the eighth decade. As discussed under Base case forecast for the Kispiox TSA, I accept that this forecast provides me with an assessment of the available timber supply, and is a good basis from which to assess the assumptions regarding land base, management practices and timber yields for this TSA.

Section 8 of the *Forest Act* requires me to consider a number of factors in the determination of an AAC for a timber supply area. In determining an AAC, my considerations identify factors which, when considered separately, indicate that the timber supply may actually be greater or less than that projected in the base case. Some factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by introducing an element of risk or uncertainty to the decision, but cannot be reliably quantified at the time of the determination.

I am satisfied that the assumptions made in the base case harvest forecast for the majority of the factors applicable to the Kispiox TSA were appropriate. Following is my

consideration of those factors for which I consider it necessary in this determination to take into account implications to the timber supply projected in the base case.

I am aware that there are a number of factors that indicate that timber supply as projected in the base case of the analysis has been underestimated. These factors are as follows:

1) *environmentally sensitive areas* – I accept that, as a result of the methodology used to estimate exclusions for class IV terrain (potentially unstable soils), the timber harvesting land base has been underestimated by up to 6 percent;
2) *non-recoverable losses* - I accept that the reductions of 190 525 cubic metres per year applied to the harvest level in the analysis to account for volume losses expected from tomentosus and balsam bark beetle, are in fact accounted for within the VDYP model used to estimate volumes in the analysis for existing stands, and as a result the harvest levels in the first decade have been underestimated by this amount, and in subsequent decades into the mid term underestimated as well;
3) *site productivity estimates* – I accept that as a result of the higher site productivity that may potentially be realized from second growth forests in the Kispiox TSA, timber supply may have been underestimated in the mid term by an amount up to 40 percent, and in the long term by an amount up to 57 percent;

In reviewing these various factors, I have the following observations. The factor having the largest single impact on the short-term timber supply projected in the base case forecast is that of the estimates for non-recoverable losses. I am aware that it was determined subsequent to the completion of the analysis that the growth and yield model used to estimate volumes for existing stands does in fact account for the losses assumed to be non-recoverable from balsam bark beetle and tomentosus. As a result, I am satisfied that it is appropriate to add this volume to the harvest level projected in the base case, which equates to a 17 percent increase in the available initial timber supply relative to the base case. Furthermore, mid-term timber supply will also be more stable due to this consideration.

Looking at the accounting in the analysis for moderately unstable areas (class IV terrain), I am satisfied that the methodology resulted in an underestimation in the size of the timber harvesting land base of up to 6 percent. Although there is not enough information currently available to more specifically quantify this factor, I do not believe that the underestimation is as great as 6 percent, as some proportion of these moderately unstable areas will prove to be unsuitable for, and consequently excluded from, development. However, I am confident that the majority of the areas will likely be appropriate for development, and that as a result, the value is in reality in the range between 3 and 6 percent. In consideration of this, and in the absence of any additional information, I apply my judgement and assess that timber supply has been underestimated on account of this one factor alone by about 4 to 5 percent.

An additional factor that suggests timber supply may be greater than projected in the analysis is that related to the site productivity of second growth forests. I believe that in general, second growth forests across the province will tend to exhibit greater site productivity than is indicated by the old growth forest currently growing on the sites. However, I note that it is difficult to assess the magnitude of the underestimation in the Kispiox TSA, in part due to the lack of useable localized data. Further, in the case of the Kispiox TSA there are a number of factors affecting managed forests which cause me to have concern about the capability of many sites to realize their full site productivity

potential. The underestimation of site productivity affects timber supply in the mid to long term only, and does not affect the short term.

I also note that the alternative harvest flow referenced earlier in this document under the appropriate section indicated that an initial harvest level 7 percent higher than that in the base case could be achieved if a slightly greater rate of decline to the mid and long term harvest levels was acceptable. This alternative harvest flow indicates to me that there is some resiliency in the short-term timber supply for the TSA which would mitigate some of the influences of those factors acting to decrease timber supply.

I then turn my mind to those six factors that indicate that the timber supply projected in the base case forecast may be overestimated, as follows:

1) *economic and physical operability* – I accept that not all of the older hemlock- and balsam-leading stands will prove to be operable over time, and that as a result timber supply across all time horizons has been overestimated by an amount that is not precisely quantified, but that in my judgement is between 3 and 6 percent;
2) *volume estimates for existing stands* – I accept that there is a risk that the volumes for existing stands in the TSA may be overestimated and that there is a risk that short-term timber supply has been overestimated, by an amount that is not precisely quantified but that is in the range of between 0 and 13 percent;
3) *Dothistroma needle blight* – I accept that the impact of Dothistroma foliar disease is of significant concern in the managed lodgepole pine stands in the TSA, and likely results in timber supply having been overestimated across the planning horizon by about 6.5 percent;
4) *not satisfactorily restocked areas* – I accept that longer term timber supply has been overestimated by an unquantified, but small amount as a result of the inability to restock backlog NSR areas as fully as assumed in the analysis;
5) *pine mushroom habitat* – I accept that it is appropriate to account for the implications of the management of pine mushroom habitat, and therefore that timber supply in the short term has been overestimated by up to 4 percent, and in the longer term by up to 2.5 percent;
6) *identified wildlife* – I accept that the implementation of the identified wildlife management strategy, including identification of wildlife habitat areas and attainment of general wildlife measures, will result in an impact to the timber harvesting land base in the TSA of up to 1 percent over the entire analysis horizon;

Looking to this set of factors acting to decrease timber supply, I note that all, with the exception of not satisfactorily restocked areas, potentially affect short-term timber supply. The concern around the future stocking of NSR areas highlights the need for continued funding sources in order to enable the treatment of stands where it makes sense, and so as to ensure previous silvicultural investments are not lost.

A few of the factors influencing short-term timber supply are possible to quantify with a greater degree of certainty. I expect that the implications of management for identified wildlife will impact timber supply by one percent across all time horizons. I expect that management for pine mushroom habitat will indeed have increasing emphasis in the TSA, and on this account I am mindful that the timber supply has likely been overestimated in the

short term by an amount close to 4 percent. Next, I look to the impacts of the Dothistroma needle blight on managed stands in the TSA, a matter of significant concern. As indicated by the discussion in this document, the timber supply contribution of managed lodgepole pine stands is greatly in question on this account. The magnitude and extent of the damage, and resulting longer-term timber supply implications may not be known for some time. Sensitivity analysis results suggest a short-term timber supply impact that may be as great as 6.5 percent. I am aware that there is a possibility that the timber supply impacts over time may be even greater than illustrated by the analysis conducted to date. There is still a high level of uncertainty regarding the ongoing stand impacts, and consequential timber supply implications, of this disease. However, given the information presented to me and my knowledge of the situation through my overview flight of the area, discussions with colleagues and experts, involvement in ongoing research and policy work, and the extensive concern about the future of those stands, I believe that it is appropriate in this determination to take into account the full 6.5 percent projected impact on timber supply.

I am aware that the uncertainty around the economic operability of older hemlock- and balsam-leading stands is of concern in the assessment of the stability of the short- to long-term timber supply in the Kispiox TSA. These stands comprise 85 000 hectares of timber harvesting land base, and as stated earlier I have reasoned that at least 10 to 20 percent of the area could well prove to be uneconomic to harvest over time. Given the lack of any empirical data around this concern, I will in this determination place weight on the lower end of this range, and assume that 10 percent of the stands will be uneconomical to harvest. An overestimation of timber harvesting land base of this magnitude suggests that timber supply has been overestimated by approximately 3 percent on this account across all time horizons. I also note that the potential impact of this factor on timber supply is sufficiently great that I request staff attempt to better quantify any uncertainty prior to the next determination for the TSA.

Further, although still subject to uncertainty due to differences between volumes suggested by the audit, and volumes noted through other field studies, I am aware that there is a possibility that volumes for existing stands have been overestimated. If volumes have indeed been overestimated by the inventory, and by the 13 percent suggested by the audit, sensitivity analysis results showed that the timber supply in the short term could be affected by 13 percent. However, given the uncertainty remaining around this factor, which indicates that any overestimation of timber supply is actually in a range of between 0 and 13 percent, I am not prepared in this determination to take a full 13 percent impact into account. In consideration of the range of uncertainty, I accept that a reasonable quantification of the impact is about the mid point of this range. Examining these three factors, I note that each is significant on its own merits. If one were to assume each of these three factors were additive, the potential impact to short-term timber supply is around 16 percent. Adding the impact of the implementation of the identified wildlife management strategy and management for pine mushroom habitat, brings the cumulative impact of those factors acting to decrease timber supply to 21 percent. I note that this set of factors has a significant influence on the short-term timber supply in the Kispiox TSA.

However, when considered in the context of those factors indicating short-term timber supply has been underestimated, I note that the two sets of factors considered together essentially mitigate one another, and suggest that the short-term harvest level projected in

the base case is likely attainable. I then bring the discussion back to the robust nature of the initial growing stock as illustrated in the alternative harvest flow discussed earlier in this section. I believe that a short-term harvest level up to 7 percent higher than shown in the base case is possible in the Kispiox TSA without unduly impacting mid- to long-term harvest levels. This is primarily due to flexibilities that exist given overall levels of growing stock, and the harvest flow assumptions applied in the analysis. I am mindful that the information presented to me, including the harvest forecasts presented in support of my determination, indicates that the timber supply in the Kispiox TSA is in decline, and will continue to experience future declines over time prior to reaching a sustainable level in the mid to long term. Further harvest level reductions will therefore likely be necessary in this TSA in the future. I am therefore presented with a choice between implementing a 17 percent reduction immediately in the harvest level followed by the projected set of 10 percent declines, and implementing a 10 percent reduction immediately followed by a projected set of 12 percent declines. I believe that the latter approach provides a better accounting for the socio-economic implications of immediate reductions in harvest levels in concert with the factors influencing timber supply as discussed throughout this document.

I am also mindful that the set of harvest level declines projected to occur in the analysis may prove to be mitigated over time by the potential for greater site productivity from second growth forests. Although I am not explicitly taking any impact into account in this determination because of the longer term nature of the factor, I do note that the potential exists for greater mid- to long-term timber supply than projected in the analysis. As mentioned earlier, the volume implications of this site productivity may be negated somewhat by the influence of the various forest health agents discussed above. Also, although I am not explicitly making an accounting in this determination, the prevalence of tomentosus root disease in some of the managed spruce stands in the TSA may affect the longer term volumes potentially available from the sites. The impact of the factors related to forest health agents is compounded by the concern around brush encroaching on backlog stands already established with coniferous species. However, the potential benefits to mid- to long-term timber supply as a result of increased site productivity is in the range of up to 40 to 57 percent, respectively, and therefore I believe that mid- to long-term timber supply will be greater than indicated in the base case despite the mitigating influence of these various factors. . I encourage staff to pursue funding to enable the collection of data localized to the Kispiox TSA, and that in particular considers the influence of these various factors.

I note that this determination excludes all volume issued to woodlot licences since the previous determination for the Kispiox TSA.

In consideration of all of this information as discussed above, I determine that an appropriate harvest level for the Kispiox TSA at this time is 977 000 cubic metres per year, which represents a decrease in harvest level of about 10 percent from the level of the current AAC.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved in the Kispiox TSA by establishing an AAC of 977 000 cubic metres, a reduction of about 10 percent from the level of the current AAC.

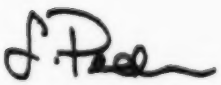
This AAC excludes all volume issued to woodlot licences since the 1996 determination.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than five years.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability of staff to undertake these projects is dependent on available staff resource time, and the availability of scarce funding resources. These projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Kispiox TSA. I recommend that district staff carry out the following:

- Attempt to better quantify the economically operable land base, particularly with respect to the merchantability of older hemlock- and balsam-leading stands;
- Monitor the proportion of class IV terrain expected to be harvestable over time;
- Clarify whether the inventory data does indeed overestimate volume estimates for existing stands;
- Collect local site productivity data to enable an assessment of the applicability of provincial site index adjustments to the managed stands in the TSA;
- Monitor the impacts of tomentosus root disease in managed stands, and the extent to which volume losses are accounted for within existing operational adjustment factors;
- Monitor the impacts of Dothistroma foliar disease, and attempt to quantify the volume implications for the next analysis;
- Continue to monitor the impacts of balsam bark beetle and tomentosus root disease on stand volumes.



Larry Pedersen
Chief Forester
November 28, 2002

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the Forest Act, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8 (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(3.1) If, in respect of the allowable annual cut for a timber supply area or tree farm licence area, the chief forester considers that the allowable annual cut that was determined under subsection (1) is not likely to be changed significantly with a new determination, then, despite subsections (1) to (3), the chief forester

(a) by written order may postpone the next determination under subsection (1) to a date that is up to 10 years after the date of the relevant last determination, and

(b) must give written reasons for the postponement.

(3.2) If the chief forester, having made an order under subsection (3.1), considers that because of changed circumstances the allowable annual cut that was determined under subsection (1) for a timber supply area or tree farm licence area is likely to be changed significantly with a new determination, he or she

(a) by written order may rescind the order made under subsection (3.1) and set an earlier date for the next determination under subsection (1), and

(b) must give written reasons for setting the earlier date.

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area,

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silviculture treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

1998-29-2; 1999-10-1; 2000-6-2; 2002-25-21.

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Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

   (a) encourage maximum productivity of the forest and range resources in British Columbia;
   (b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;
   (c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;
   (d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and
   (e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

Appendix 5: Summary of Public Input

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
OFFICE OF THE MINISTER

Ministry of Forests

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: The Crown's Economic And Social Objectives Regarding Visual Resources

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis*.

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests

Kispiox Timber Supply Area
Timber Supply Review

Summary of Public Input

BC Ministry of Forests

Mailing Address
Kispiox Forest District
Bag 5000
Smithers, BC V0J 2N0

Office Location
2210 West Highway 62
Hazelton, BC

November, 2002

This is a summary of the public input received on the Timber Supply Review in the Kispiox Timber Supply Area. This summary does not assess the feasibility or validity of the input or whether it relates to the clearly defined mandate of the chief forester in the allowable annual cut determination.

Kispiox Timber Supply Area

Background

As part of the review of timber supply in the Kispiox Timber Supply Area (TSA), two opportunities were provided for public input. The first followed release of the Kispiox TSA *Data Package* and *Information Report* in October 2000. The *Information Report* was a non-technical summary of the draft data and management assumptions that were to be applied in reviewing the timber supply for the Kispiox TSA. A 30-day review period, ending November 20, 2000, was provided for the public to comment on these documents.

On May 2, 2002, the British Columbia Forest Service released the *2002 Kispiox Timber Supply Area Analysis Report* and *Public Discussion Paper*. The public was encouraged to review and comment on the accuracy of the information in these documents and to provide additional information during the 45-day review period that ended June 17, 2002.

This report summarizes the input received during both public review periods. This information was provided to the chief forester for his consideration when he reviewed the allowable annual cut (AAC) for the Kispiox TSA. The first section of this summary outlines the public review process implemented by the Forest Service, and describes the types of public input received. The second section summarizes the public input in sufficient detail to indicate the range of input received. The original submissions (with personal identifiers removed in accordance with the *Freedom of Information and Protection of Privacy Act*) can be reviewed at the Kispiox Forest District office in Hazelton.

Public Review Process and Response

Staff from the Kispiox Forest District actively solicited public input on the Timber Supply Review in the Kispiox TSA through the following actions:

- 12 copies of the Data Package, Information Report, Analysis Report and Public Discussion Paper were mailed to licensees and MLAs.
- 280 letters were sent to stakeholders in the TSA, including First Nations, licensees, local governments and environmental groups, advising of the availability of the documents for review.
- the Data Package and Analysis Report were available at the district office in Hazelton and the regional office in Smithers.
- newspaper advertisements were placed, advising of the availability of all documents for review by the public.
- copies of the Public Discussion Paper were made available to the local media, along with a press release.
- referrals were made to the Ministry of Forests website where documents were available to download.
- on June 4, 2002, a presentation was made in Hazelton to eight people from the Gitxsan Treaty Office, at their request.

The forest district and regional offices received four written submissions on the *Data Package* and seven submissions on the *Analysis Report* (see Appendix 1).

Public Input

In this section, public input on the information presented in the Timber Supply Review documents for the Kispiox TSA is summarized under the following headings:

- Data Package (and Information Report)
- Timber Supply Area Analysis Report
- Other comments

Data Package

Environmentally Sensitive Areas

Three forest industry submissions say the 95 per cent netdown for potentially unstable terrain is high and does not reflect current management practices. They make the following points:

- these sites are largely maintained within gross cutblock areas and are harvested in full or in part without environmental impact. Cable or aerial harvesting is also suggested for this terrain.
- these sites may also be used for Wildlife Tree Patches (WTPs), leading to a possible duplication in netdowns.

Bell Pole says they have completed terrain stability mapping in three operating areas, and a review of current management in those areas suggests a five per cent netdown factor may be more appropriate. The company says further reductions are covered by other constraints or assumptions (operability, forest cover, WTPs, riparian areas, etc.).

Low Sites and Unmerchantable Types

The submission from Skeena Cellulose Inc.-Carnaby (SCI-Carnaby) says areas of low stocking that are removed from the timber harvesting land base must still be eligible to contribute to old-growth requirements.

The submission from Skeena Cellulose Inc.–Terrace (SCI-Terrace) recommends that the minimum volume threshold that defines low productivity sites should be modified to include a minimum piece size.

Roads, Trails and Landings (RTLs)

An individual submission notes that roads are deactivated regularly when they could be used by other interests (e.g., mushroom harvesters, prospectors), possibly with a fee imposed to offset construction and maintenance costs.

The three forest industry submissions all express concern about the assumptions and netdowns used for RTLs, particularly for future RTLs. The following points are made:

- how was the preliminary estimate of 7.3 per cent derived? Other TSAs have used a netdown of six per cent.
- the fact that landing sizes have been decreasing needs to be described and accounted for.
- the 10-metre width used for other trails/roads needs to be reviewed.
- it's unclear how reductions are applied in community watersheds and special management zones, for existing versus future RTLs.
- how are existing out-of-block roads, which will over time be included as in-block roads, dealt with?
- since the basic road infrastructure of the TSA is in place, secondary roads should be removed from the current RTL netdown.

Expected Rate of Growth

SCI-Terrace says estimates of site productivity appear to be very low. The company says the fact that studies in the Kalum TSA have resulted in massive increases in site productivity for hemlock- and balsam-leading stands should be analyzed.

Bell Pole and SCI-Carnaby question how operational adjustment factors (OAFs) were determined. Bell Pole says small unproductive areas within stands (accounted for by OAF1 adjustments) are largely captured within WTP areas and may be considered as accounted for in WTP reductions.

Regeneration Delay

Three forest industry submissions express concern with the regeneration delay to be used in the analysis. Bell Pole and SCI-Terrace note a discrepancy in the *Data Package*, where the

discussion refers to one-year-old stock being planted 1.02 years after harvest, yet the table uses a five-year regeneration delay for hemlock- and balsam-leading stands. SCI-Carnaby says the regeneration delay should be 0 years on all analysis units.

Silvicultural Systems

Three issues are raised by the forest industry submissions.

The first is the description of the extent of various silvicultural systems applied in the TSA. Bell Pole says the proportion of non-clearcut areas may be biased by the drastic reduction in harvesting by major licensees since 1997 and the fact that small business operations may use non-clearcut systems more frequently. SCI-Carnaby says that all current silvicultural prescriptions should be reviewed, as well as the harvesting history from 1996-1998.

The second issue is density control and spacing. SCI-Terrace says an initial density of 3,000 stems per hectare (sph) spaced down to 1600 sph is far too conservative, noting that the biggest problem in the TSA is the decadent timber supply and the need to get second growth to a merchantable size as soon as possible. The company says initial densities should be reduced where possible and future stand entries should reduce densities to a much lower level (1,000 sph or less). SCI-Carnaby says the statement that licensees will only space when density exceeds 10,000 sph needs to be confirmed with licensees to accurately reflect current management.

The third issue concerns immature plantation history. SCI-Carnaby says the analysis should include the effect of increased management on stands older than 20 years, rather than just the effect of less management.

Green-up Ages

Bell Pole and SCI-Carnaby express the opinion that the green-up ages used in the *Data Package* seem excessively high, which Bell Pole says could be verified by an analysis of silviculture and green-up survey data that is readily available.

The two companies also question the green-up ages for "landscape units—water quality." Bell Pole questions the validity of the information but says there's inadequate discussion provided to allow for comment. SCI-Carnaby stresses that there are no landscape units in place, only drafts, and questions the assumption that green-up ages increase significantly from southwest to northeast (Table 22d).

Visual Quality

SCI-Carnaby says visual quality objectives do not account for remoteness and green-up ages of up to 44 years do not seem logical. The company says height may not be the best measure of visual green-up, and suggests that crown closure be analyzed as an alternative.

Riparian Management

Bell Pole makes several comments on assumptions relating to riparian management, including the following:

- there appears to be inconsistency between the riparian reserve width of 25 metres for S2 streams versus the 30-metre Forest Practices Code requirements.
- was the 1999 GIS analysis applied on a representative sample of the TSA; this is important given the influence of climate and topography on the physical location and extent of riparian areas.
- further analysis is needed regarding duplication of removals due to overlap between riparian areas and WTPs.

SCI-Carnaby notes that the District Operating Procedure for riparian management was not agreed to by the TSA steering committee.

Watershed Management

Bell Pole questions how the maximum allowable disturbance figures were derived for watersheds, both for community watersheds and for landscape units—water quality.

SCI-Carnaby makes the following points with regard to landscape units—water quality:

- there are no landscape units in place, only drafts.
- it seems that community watersheds are less constrained than these units.
- Table 22a indicates a 15 per cent maximum allowable disturbance whereas the text indicates a 22 per cent equivalent clearcut area.

Wildlife Tree Patches

Three forest industry submissions raise a number of issues regarding WTPs. The most frequent concern is confusion around distinguishing between WTP areas reserved for wildlife objectives versus WTP areas reserved for riparian, terrain stability, operability or other objectives. The companies say there's a likelihood of duplicate reductions and that area reporting of WTPs is not adequate for timber supply analysis needs. SCI-Carnaby says the lack of clarity in WTP figures may reflect improper terminology; for example, accessible "WTPs" in excess of three per cent could be described as short-term deferrals, harvestable at green-up of the surrounding area. SCI-Terrace says if there's difficulty in determining how much area set aside for WTPs is operable or has already been removed through other netdowns, this analysis provides an opportunity to clarify and improve this process.

Other comments from the forest industry submissions include:

- the 10.9 per cent netdown for WTPs should not be used; further analysis is needed.
- it's premature to use the *Landscape Unit Planning Guide* recommendation of three per cent WTP retention, as landscape units haven't been designated and objectives established. A target retention of six per cent may be more appropriate and better reflect current management practices.
- productivity within WTPs is lower than outside them, so there is only a partial correlation with timber supply impacts.
- WTP area should be based on gross cutblock area, not net.
- the biodiversity District Operating Procedure should be analyzed to determine its impact.

An individual submission says there's no mention of moose populations, which are not indigenous but have migrated to the TSA since tree harvesting began to open areas for them.

Landscape Level Biodiversity

Bell Pole notes the reference to the Kispiox Land and Resource Management Plan (LRMP) requirement of 12 per cent old-growth retention and says this is not an LRMP requirement but a strategy to achieve the biodiversity objectives that are themselves the binding requirements of the LRMP. The company says using the 12 per cent constraint on the Crown forested land base may not be appropriate for this analysis. Bell Pole also notes that ongoing landscape unit planning may be considered an alternative strategy to the 12 per cent retention and may be inappropriately considered an additional constraint.

SCI-Carnaby questions the rationale for considering that only areas with greater than 70 per cent retention will contribute to old-growth requirements.

Land-Use Planning

SCI-Terrace and SCI-Carnaby take issue with references to the "requirements" of the Kispiox LRMP and the Babine Land and Resource Use Plan. The companies say the "requirements" are invariably "strategies" which are not part of

any higher level plan but are simply possible tools for meeting an objective. SCI-Carnaby says netting down the timber harvesting land base to reflect strategies is inappropriate and should be reversed.

Harvest Sequence and Deferrals

SCI-Carnaby says more primary forests need to be harvested early, so more forest land can come under management and become a source of higher value second-growth timber, resulting in a more stable and more efficient forest industry. The company also says the 10-year harvest restriction for the Atna/Shelagyote area should be removed, as there is a forest development plan proposal under discussion.

Unsalvaged Losses

An individual submission says that when unsalvaged loss figures become available, an immediate review is required. This individual notes that salvage operators are frustrated by bureaucracy and limited supervisory resources.

Socio-Economic Factors

Three submissions comment on statements made in the *Information Report* regarding the TSA's economy. They make the following points:

- the TSA economy is not well-diversified, but is very dependent on the forest industry. Almost all companies operate under an economic plan, and poor quality timber, high costs and poor markets have resulted in reduced activity and employment, and increased foreclosures of businesses relying directly or indirectly on the forest sector.
- because of high community dependence on the forest industry, the employment multipliers should be larger than those used by the ministry of finance and corporate relations. For example, the Coast Forest Lumber Association suggests a ratio of four jobs/1000 cubic metres of AAC, and the Kalum LRMP uses two jobs/1000 cubic metres.
- forestry jobs are not comparable to tourism jobs, as the latter are very low-paying and seasonal.
- the five per cent population growth since 1996 will likely be reversed due to the area's dependence on an unreliable forest sector.
- the estimate that 31 per cent of the jobs created by timber harvesting/processing in the TSA are located outside the TSA appears to indicate an imbalance in the supervisory-to-worker employment ratio.
- Kispiox Forest Products did not resume operations in October, 2000, as anticipated by the *Information Report*, and they will likely have financial difficulties if/when they do open.

Timber Supply Area Analysis Report

Operable Land Base

Philpot Forestry Services Ltd. (Philpot) says there appears to be no exclusion for areas that are physically operable and have acceptable volumes, but have such low sawlog content or require such expensive development and long hauls that the economics do not allow a profitable operation. The company says there are numerous stands within the Kispiox district that are economically operable only at peak market periods and only for a short time, and so they are generally avoided. Including these low-value stands in the timber supply analysis means that better stands are proportionately more rapidly depleted and the timber profile is continually degraded, according to this submission.

Environmentally Sensitive Areas

Bell Pole Company says the netdown of 95 per cent for potentially unstable terrain (Terrain Class IV) is grossly excessive and has been determined improperly. Basing the netdown on the fact that only five per cent of

potentially unstable terrain within the timber harvesting land base (THLB) has been harvested fails to consider that there remains a large portion of the THLB that has not been harvested, according to the company. Bell Pole says a more appropriate procedure would be to estimate the amount of potentially unstable terrain harvested to date as a proportion of the potentially unstable terrain within the total area harvested to date.

Bell Pole says a review of their harvesting indicates that potentially unstable lands are typically harvested by cable-based systems, and are generally constraining only to road location and construction.

Site Productivity and Volume Estimates

Philpot says they strongly agree that site index has been underestimated for old coniferous stands.

Bell Pole says the volume increase attributed to the use of class A pine seed should not be fully discounted due to pest problems associated with pine. The company says at the very least the effects of improved seed progeny with regard to forest health factors (e.g., fewer losses attributed to pine pests) should be considered.

Regeneration Delay

Bell Pole says the assumption of a regeneration delay of five years for hemlock and medium- and poor-quality balsam stand types seems quite inappropriate. The rationale that these stand types will demonstrate natural ingress and release of natural stock and will thereby convert to hemlock and balsam implies that the natural stock is outperforming the planted stock, which does not mean a setback in the stand regeneration schedule, according to this submission. The company notes this assumption has compounding implications to many factors in the analysis and it should be reviewed.

Forest Cover Requirements

Bell Pole questions the statement in the *Analysis Report* that the Kispiox LRMP requires that a maximum of 15 per cent of the stands in the total forested area of each landscape unit be less than six metres tall. Rather, the company says, the LRMP says that on average, no more than 22 per cent of the forested land in a watershed will be in a hydrologic condition equivalent to a clearcut.

Using the ministry of forests' methodology, Bell Pole calculates that a constraint of 32 per cent of the THLB less than nine metres tall is consistent with the 22 per cent equivalent-to-clearcut strategy. Noting that the same issue also occurs in the consideration of requirements within community watersheds, the company says this may be a very important flaw in the analysis and should be carefully reviewed.

Riparian Management

Philpot says the timber supply analysis underestimates the area of land that should be excluded from harvesting as Riparian Reserve Zones (RRZs), particularly for small streams (S5 and S6). Although the Forest Practices Code does not require RRZs for S5 and S6 streams, Philpot says this is current practice, based on their experience over the last eight years. The company estimates that for the last 20 silviculture prescriptions they've prepared, the reserves (RRZs and WTPs) total 24.4 per cent of the gross cutblock area.

Philpot maintains more attention is needed for these small streams, as well as small wetlands, as they are very important habitat for many organisms and have significant downstream effects on water turbidity, chemistry and temperature. A greater exclusion for RRZs is needed, according to this submission.

Wildlife Tree Patches

Bell Pole says it is excessive and inappropriate

that the THLB has decreased by 32,180 hectares due to unharvested retention (WTPs and other reserves) within cutblocks. The company makes the following points:

- higher levels of retention have been prescribed in the recent past in order to compensate for lower levels of retention historically.
- the assumption of no harvesting in WTPs may not be true, due to forest health concerns or changes in objectives due to the establishment of landscape unit objectives.

Bell Pole recommends a longer-term average retention level be used or the *Landscape Unit Planning Guide*'s average target for the TSA could be considered to reflect current management practices.

Harvest Flow

Bell Pole notes that the *Analysis Report* says it's possible to achieve a higher initial harvest level if a 12 per cent rate of decline per decade were applied, rather than 10 per cent. The company says if the AAC is to be reduced, this higher rate of decline should be considered, as influenced by the status and needs of the industry within the TSA in the short term.

Unsalvaged Losses

Bell Pole says the *Analysis Report* presents a significant volume reduction for unsalvaged losses, but there's been no attempt to differentiate between endemic and epidemic losses. The company says no rationale is provided as to why Tomentosus root disease has been elevated from being an endemic agent to a catastrophic one, and raises several questions about the Tomentosus study. With regard to the balsam bark beetle, Bell Pole says the use of the last 10 years' historical records ignores the premise that the rate of incidence of attack has risen sharply only recently.

Bell Pole recommends that the chief forester consider the potential flaws in the conclusions drawn from the available information, and also the limited opportunity provided for review of this information due to its late inclusion in the Timber Supply Review process.

Socio-Economic Factors

A submission from Skeena Cellulose (Carnaby and Smithers) and Kitwanga Lumber Company says the socio-economic analysis section lacks important information about the undercut. The reasons given in the analysis are limited to mill closures, but this submission questions if the undercut is due to:

- the current economic policies of the ministry of forests;
- economic disparities between licensees with regards to operating areas; and/or
- the marginal conditions present in the northern stands, caused by poor wood quality and high operating costs.

The companies say mill closures are symptoms of a poorly functioning system, rather than the reason for reduced harvest levels. They maintain that unless regulatory and/or policy changes occur and the ministry of forests' valuation system is changed, licensees' ability to operate or sustain a business will be jeopardized.

First Nations and Cultural Heritage Resources

The submission from the Office of the Wet'suwet'en says that they do not agree with the Timber Supply Review process, particularly since they do not feel their input to other processes has been taken seriously. They say the economic needs of the forest sector are given priority and that inadequate funding and increasingly "streamlined" regulatory controls have reduced their ability to influence the management of natural resources or the protection of their traditional uses, in a manner that reflects their vision.

The Wet'suwet'en estimate that 60 per cent of their cultural heritage has been destroyed by development activities, and say the loss of forested areas (particularly low-elevation forests in the northern half of their territories) has significantly affected their culture. The Wet'suwet'en say they wish to first inventory their remaining cultural heritage, and then appropriate levels of management for both timber harvesting and their cultural heritage can be determined.

The submission from the Gitxsan Treaty Office provides extensive detail on the analysis they conducted to test whether the forests in the Kispiox TSA have been overcut and highgraded in the past and whether, as a result, the remaining forest has greatly reduced commercial viability. This submission says they conclude that the Province has likely infringed on the Gitxsan Houses' aboriginal rights and title by failing either to set an AAC that reflects the timber profile being used by licensees or to regulate the cut so it matches that profile. They believe that this has resulted in a degraded forest that may have insufficient viable timber for the Gitxsan Houses to develop a sustainable, self-sufficient economy in the future.

The submission from the Gitxsan Treaty Office says that to prevent such infringement continuing, the chief forester must consult with the Gitxsan to ensure that:

- an interim AAC is set immediately to stop further infringement;
- joint research occurs to produce an inventory of timber quality and a means of monitoring the depletion of that inventory by quality class on each House territory;
- consultation occurs to decide how the Province's ongoing obligation to consult and seek accommodation with the Gitxsan can be accomplished; and,
- as soon as the above research and consultation is completed, a new AAC is determined.

The Gitxsan Treaty Office notes that by engaging in the above consultation process, the Gitxsan Houses do not waive any rights to compensation that may arise from past infringements of their rights and title due to forest degradation by the Province.

In a meeting with Kispiox district staff, the Gitxsan chiefs express an interest in protecting cedar and also obtaining wood for shelter in their House territories.

Other Comments

Many submissions comment on factors or issues other than those specifically covered by Timber Supply Review documents. These comments are summarized in this section.

Timber Supply Review Process

SCI-Terrace and SCI-Carnaby say that landscape units are still draft, do not reflect current management, and should not be used in the base case. SCI-Carnaby expresses concern that only the ministry of forests' draft landscape units are proposed for analysis, with no mention of the alternate units submitted in 1999.

Both companies also say the general tone is of increased constraints, resulting in an overly conservative base case. SCI-Terrace says the *Data Package* has prejudged some of the uncertainties and issues by incorporating them into the base case. SCI-Carnaby also notes a lack of consistency in the time periods used for gathering base data, and submits detailed questions and recommendations regarding a number of sensitivity analyses.

The Gitxsan chiefs, based on approved minutes from a meeting with district staff, raise various concerns and questions about the Timber Supply Review process. These include:

- a request for a meeting with the chief forester, and the opportunity to attend the AAC determination meeting.
- what is the role of the chief forester? For example, is his mandate to make money? Does he consider First Nations' unknowns?
- First Nations are using a different model for forest management activities, based on House territory boundaries, and suggest the chief forester consider this model as a reason to do a new analysis.
- why aren't the Gitxsan mentioned on the list of reasons why the AAC may change?

Harvest Levels

Philpot Forestry Services says it is poor management to calculate an AAC based on the total operable land base when a significant proportion is economically operable for only short and sporadic periods of time. The company makes the following recommendations:

- low-value stands should be identified through economic appraisal of costs and potential values, and the AAC reduced accordingly.
- these low-value stands should be classified as "opportunity wood" with a second AAC to be used only when economics justify operations in these stands.

The submission from Skeena–Cellulose/Kitwanga Lumber says a reduction in AAC may be justified, based on the assumptions used and the reduction in land base due to parks and harvest restrictions. However, the companies express the opinion that much of the anticipated reduction could be offset by use of more realistic site productivity values for older stands.

Apportionment and Tenures

K'Shian Logging and Construction says they have a secure market for cottonwood and wish to apply for approval to cut about 15,000 cubic metres per year from the TSA through various licences, as well as obtaining some from private land. The company says this long-term market opportunity will help small business owners and create employment in the Kitwanga, Kispiox and Hazelton areas.

The Gitxsan Chiefs question why there are so few woodlots and ask how their AACs are established.

Appendix 1

Submissions received by the Kispiox Forest District

Submissions received on the Data Package

Forest industry

Bell Pole Company
Skeena Cellulose Inc. – Terrace Operations
Skeena Cellulose Inc. – Carnaby Operations

General public

One individual submission

Submissions received on the Timber Supply Analysis Report

First Nations

Office of the Wet'suwet'en
Consultation meeting with Gitxsan Chiefs (approved minutes)
Gitxsan Treaty Office

Forest industry

Bell Pole Company
K'Shian Logging & Construction Ltd.
SCI Carnaby and Smithers; Kitwanga Lumber Co.

Consultants

Philpot Forestry Services Ltd.